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Official Organ of the Educational Research Association

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POSSIBILITIES OF OBJECTIVE TECHNIQUES IN SUPERVISION

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THE title of this paper implies that there are techniques other than those which are objective and quantitative. Of course there are, and the different types of supervision are based not only upon the varying abilities and habits of the supervisors but also upon the varying theories of supervision which consciously, or unconsciously, determine the day's work of the supervisor.

Although an exhaustive examination of theories of supervision would be out of place in this article, as well as beyond the ability of the writer, a few observations will serve to give the mental set for the techniques of supervision suggested later. Much supervision is based on the curious theory of no theory at all. Problems are met or dodged as they come up. Responsibilities are at times assumed and similar ones on other occasions avoided. Such supervision in practice is usually about as good as the theory upon which it is based.

Another type of supervision is built upon a theory which has as a central factor the teacher's responsibility and leadership. No theory or practice of supervision which would be prosecuted by sane men and women would deny to teachers any responsibility and leadership which they are capable of supplying. Some types of supervision, however, in theory would place certain responsibilities upon supervision as an integral part of a school system in contrast to teaching as an integral part of a school system. This second type of supervision springs from a theory of school organization in which the classroom teacher overtly, or indirectly, assumes

the responsibility of educational leadership. The supervisor becomes a sort of liaison officer plus the sponsor for sporadic drives of one kind and another. It is highly improbable that much good is derived from the practice of putting on a drive in spelling at one time, of testing and plunging into arithmetic at another, of stirring up much enthusiasm and anxiety about art at another, and of standing by to watch these drives slowly die out like waves after a storm. Such procedure is certainly not constructive supervision. What we want is steady perpetual guidance. A supervisory technique which cannot be maintained as a permanent aspect of the life of the school warrants little confidence.

A third type of supervision is based on the theory that the supervisor has certain definite responsibilities and duties, responsibilities which when exercised by a teacher transform her for the moment into a supervisor. This type of supervision has no necessary implication of subduing, undervaluing, oppressing, or cramping the teacher. It does, however, assert certain prerogatives and only considers its work well done when the supervisor does certain things which the teacher does not do. Those who believe in this type of supervision would also contend that, without clear and definite responsibilities, the task of the supervisor tends to degenerate into that of a dignified bookkeeper, the innocuous guardian of the test records, the grand pourer of oil on waters troubled by parents, the official entertainer of visitors, and the general busybody.

While the next analogies are not fair to either view of supervision suggested, they help to distinguish a real difference in theories of supervision. One theory of supervision would suggest that a school is analogous to a soviet (of teachers). The other would suggest that a supervisor and his teachers are analogous to a master surgeon directing the work of well-equipped internes and trained nurses. The objective techniques of supervision listed below would operate better on the idea of a master surgeon than on the soviet idea of school organization.

The objective techniques of supervision described in this paper deal exclusively with arithmetic, and they have been in actual use for two years in experimental centers.[1] The concrete illustrations,

[1] Repp, Austin. "The Supervisor as a Production Manager." An unpublished study on file in the Library of the College of Education, State University of Iowa.

which follow, are not meant to imply that these tools of supervision in the hands of other workmen could not be used differently, or that it would be impossible to devise another kit of tools for doing the same type of work. A list of the tools to be used in objective supervision of arithmetic follows:

Tool 1. Weekly inventory drills.
Tool 2. Teacher's diagnostic record, from Tool 1.
Tool 3. Teacher's weekly report to supervisor, from Tool 2.
Tool 4. Supervisor's control chart, from Tool 3.
Tool 5. Supervisor's weekly report to teachers, from Tool 4.
Tool 6. Diagnostic tests, used as Tool 4, show need.
Tool 7. Remedial units, used as Tool 4 and Tool 6, show need.
Tool 8. The text (course of study), revised through Tool 1 and Tool 6.

THE TOOLS OF SUPERVISION

Tool 1: Weekly inventory drills.—These weekly inventory drills are a series of mixed drills in the fundamental operations to be given once a week. Each grade has its own series. These drills are not "any old kind" of drills. They must be built according to rather exacting specifications. Their one chief purpose for the pupil is the maintenance of skills previously learned. They are used by the supervisor as the source of data for his perpetual inventory of the progress in the production of arithmetical skill.

The specifications for these inventory drills can be studied for their importance and adequacy from several printed sources. Space forbids their description here. The shrewd supervisor will make sure that material used as inventory drills will actually possess such a set of specifications as are described in the references.[2] An illustration of these drills is given in Figure 1.

Genuine standards for these drills are highly important to the supervisor. By proper statistical treatment raw scores or raw standards can be translated into ratings so that the same rating will always mean the same thing in all grades. This greatly simplifies the sheer vocabulary load used in connection with the attainments of classes and individuals.

[2] Department of Superintendence, National Education Association. *Third Yearbook.* Washington, D. C., National Education Association, 1925. p. 63 ff. Teachers' Edition of the *Arithmetic Work-Books*, Grades III-VIII. Chicago, Scott, Foresman and Company, 1926.

A series of properly constructed drills scientifically standardized is the first tool of an objective type of supervision. This is a really adequate tool only when the pupil's performance on each drill is conveniently expressed in terms of numerical ratings which have

Directions. Wait for the signal "Go!" Wherever possible save copying by placing your paper right below any example. Number examples as you work them.

Time allowed: 20 minutes. Work as fast as you can without mistakes. Do the examples and problems in order.

Rate yourself. **Try to beat your past records.**

1.	2.	3.	4.	5.
$55\overline{)1760}$	$47 \times 100 = ?$	10565	80656	174
		-3319	-39678	707
				316
6.	**7.**	**8.**	**9.**	835
$5\frac{5}{8} + \frac{1}{2} = ?$	$72\overline{)664}$	$7\frac{1}{2} - 5\frac{1}{2} = ?$	.408	849
			$\times 4.9$	482

10.	11.
$71\overline{)6303}$	$3.66 + 6 + .25 + 1.75 = ?$

12.	13.	14.	15.
$2\frac{1}{6} \times 1\frac{1}{2} = ?$	$\frac{3}{4} \times \frac{3}{4} = ?$	$2\frac{1}{4} - \frac{3}{8} = ?$	$2.0075 - .385 = ?$

16. A pupil has 15 recitation periods per week, each 30 minutes long. How much time, in hours and minutes, per week does he recite?

17.	18.	19.	20.
675	$\frac{3}{4} \div \frac{1}{8} = ?$	$273 \div 102 = ?$	What is the reciprocal of $\frac{9}{13}$?
$\times 540$			

Standards

Number correct	0–6	7–8	9–10	11	12	13	14	15	16	17–19	20
Rating	0	1	2	3	4	5	6	7	8	9	10

Figure 1. A Sixth-Grade Self-Testing Drill

a perpetually identical meaning. Pupil and class performances on such drills give to the supervisor crucial information at such times that supervisory leadership in the children's actual arithmetical experience and development during the year is made possible.

Tool 2: The teacher's diagnostic record.—The form shown in Figure 2 is that upon which is kept each teacher's record of the

essential information gathered from the work of her class upon a weekly inventory drill.

From these data derived from the material used as drill, the teacher gets a class rating and the evidence indicating which process or processes seem to trouble and which pupils need attention. This

TEACHER'S DIAGNOSTIC RECORD: DRILL 1

		Number of Pupils Solving Each Example or Problem				
	Year	1925–26				
	Date	Oct. 2				
Examples and Problems by Number	1	30				
	2	30				
	3	27				
	4	25				
	5	24				
	6	20				
	7	17				
	8	19				
	9	20				
	10	18				
	11	10*				
	12	18				
	13	10*				
	14	9*				
	15	15				
S	Sum	292				
N	No. pupils in class	30				
A	Average (S ÷ N)	9.7 = 10				
A.R.	Average rating of class	4				
Diagnosis of weaknesses and special difficulties in need of remedial work. Record all examples and problems failed by a large percentage of the class by number and name of process involved. Use reverse side of page for further records, particularly your notes on remedial work assigned.		*Example 11, Long Division Example 13, Long Division Example 14, changing the form of fractions.				

Figure 2. Form for the Teacher's Diagnostic Record

essential information about a class is gained in connection with regular drill work. The use of identical material for both drill and testing is good management because it saves time and allows the frequent gathering of important data. That is, this procedure makes possible a bona fide and systematically continual inventory. The continual inventory in contrast to the yearly inventory is the

significant characteristic of a truly objective system of supervision because it reveals useful facts at the time such facts can affect practice.

Tool 3: The teacher's weekly report.—The main facts of the weekly inventory should be sent to the supervisor. A form which may be used for this purpose is suggested in Figure 3.

From such a report the supervisor gets the important data from each class once each week. The crucial facts can be reported by symbols as in Figures 3 and 4. These are of course meaningless to a casual observer. To the supervisor they give pertinent facts

No. 16 TEACHER'S WEEKLY ARITHMETIC REPORT Date 1-8-'26
Sent to Supervisor

Grade 5 School Central City Gladbrook Teacher Golda Moore

Class Rating ____ No. of Pupils ____ Ratings of previous years ____ ____ ____

CLASS			INDIVIDUAL		ACTION RECOMMENDED	
Ex. No.	Sch. No.	No. Enrd.	Q; Pupils - ratings - Weakest skills - I.Q.'s	Class or Individual	Remedial Cards	Tests
14	7	25	L 7(6), D 2(5), E 3(6), Q 4(5),			
13	8	28	a 1(1), W 4(5), R 1(2),			
9	16	12				

Instruction block Subtraction of fractions will be finished and supervisory test can be given about the date of 1-12-'26.

Figure 3. Suggested Form for the Teacher's Weekly Report

at a glance. Frequent information of this sort marks the main difference between the objective techniques of supervision and the more casual types of school control. No claim is made for the magic of weekly reports, in contrast to reports every two weeks, but there is a real advantage in having the crucial data frequently available in convenient form.

Tool 4: The supervisor's control chart.—The supervisor may make decisions relative to the work in arithmetic directly upon receipt of the weekly report and thus eliminate the use of Tool 4. However, for purposes of studying the year's work most readers will agree that a minute or two spent in transcribing the data from the weekly report to a permanent record will have sufficient advantages

Supervisor's Arithmetic Record

| Class | | | | Q Pupils to Observe and Study | | | |

to pay for the trouble. This permanent record (the control chart) is much like the kind of perpetual record of expenditures frequently seen on the office walls of school administrators. The control chart records educational income and outgo in the same way as modern bookkeeping records financial receipts and disbursements.

An illustration of the appearance of a control chart is given in Figure 4. From it, at a glance, the supervisor employing objective techniques can see the present status of arithmetic for all classes. The first section of the chart contains such information regarding

No. 16 INSTRUCTIONS TO TEACHERS Date. 1-11-26

Grade 5 School Central City, Gladbrook Teacher Yolis Moore

Diagnostic and Remedial Recommendations

Tests by No. (see keys)		Remedial Cards by No. (see manual)	
Class VI		Class	
Individuals		Individuals	

Informal Comments

Continue without interruption on 6 until next Wednesday, 7 and 8 will be attended to later.

By A.C.R
supervisor

Figure 5. Supervisor's Weekly Suggestion Blank

the whole class as date of each inventory drill, the class rating, and the weakest skills. The *N* columns of the second section tell which pupils fell into the lowest fourth of the class on each drill; the *S* columns, in what skills they were weakest; and the *R* columns, their rating on the drill. Space is also provided for recording the intelligence quotients of pupils falling into the lowest quartile for three consecutive weeks. The third section of the chart shows the diag-

nostic tests given, the groups tested, and the scores made. The fourth section indicates the remedial work used, and the last section is reserved for any remarks the supervisor may wish to record.

Tool 5: The supervisor's weekly suggestion blank.—The supervisor, with the essential facts about a class before him on his control chart, can really direct the teacher when need arises. For this purpose he may use a blank similar to that shown in Figure 5. If Mary Smith, a pupil in Grade V, has been reported for three consecutive weeks for low ratings on her inventory drills, the supervisor may give directions for the diagnosis of her difficulties and remedial work can be started. When a teacher's weekly report shows that addition of fractions will soon be finished, the supervisor should make sure that this skill is properly mastered before the teacher goes on to the subtraction of fractions. This is the time to visit and to test to make sure that that "block" of the course of study is well done. It is for the supervisor to say whether or not the class should go on. If long division is reported for the third time as the weakest process on the inventory drills for a fifth-grade class, the supervisor has evidence that diagnosis and remedial work are needed by the class. He will know that the time to treat a sag in long-division skill is *now*. He will send material to check this arithmetical sickness before it becomes chronic. Example after example could be presented to show how the steady hand of the wise supervisor can be constantly present in every class because essential facts are reported to him weekly, and he can act on those facts when necessary.

Tool 6: Diagnostic tests.—The minimum equipment for the supervisor should include a complete series of diagnostic tests which should comprise: (1) addition, (2) subtraction, (3) multiplication, and (4) division of whole numbers; (5) addition, (6) subtraction, (7) multiplication, and (8) division of fractions and mixed numbers; (9) addition, subtraction, and multiplication of decimals; (10) division of decimals; (11) addition and subtraction of denominate numbers; (12) multiplication and division of denominate numbers; (13) mensuration; (14) the basic facts of percentage; (15) interest and business forms; (16) definitions, rules, and vocabulary of arithmetic; (17) problem analysis, elementary;

(18) problem analysis, advanced; (19) general problem scale, elementary; and (20) general problem scale, advanced.

The characteristics of effective diagnostic tests, the use of such tests with a class and with individuals, and what to do after testing are separate discussions which cannot be touched upon here. A supervisor to be technically competent must study this tool, diagnostic testing. Such study will reveal possibilities of control and improvement in arithmetic which will be nothing short of exhilerating to a supervisor once he knows this tool well enough to use it prudently. Survey tests are not abandoned, for the weekly drills are survey tests.

Tool 7: Remedial units.—A doctor in treating a patient uses medicine already made. He does not take time to manufacture it on the spot. This is possible because medical science knows enough about common physiological disturbances so that it can get ready for the breakdowns beforehand. The educational and psychological sciences now know enough about many of the ailments in arithmetic to prepare remedial units before breakdowns actually occur. Leisurely manufactured remedial units are quite likely to be of better quality than those made up over night under the pressure of an emergency.

When on the job the supervisor uses, rather than makes, remedial units. His job is to know what remedial units he has and the specific purpose each unit serves. He then diagnoses and prescribes. Having decided what remedial units to use, he finds providing a stock of these a simple matter. The important points here are for the supervisor to make sure that the material is right, that it is available, and that he himself is a competent prescriber of remedial units. The examination of Table I will show how scores on competent diagnostic tests (Tool 6), and remedial units (Tool 7) may gear in together.

A possible objection may be raised to Tool 7, namely, that the nature of breakdowns in arithmetic cannot be predicted and hence remedial units cannot be made ahead of time. The truth apparently is that the peculiar and magical individuality of breakdowns in arithmetic are largely figments of the imagination. Scientific tabulation and analysis of errors in arithmetic show that a vast majority of them fall into certain well-defined types, in fact they can be pre-

dicted with some degree of certainty. This being the case, adequate remedial units can be made ahead of time. Those essentially unpredictable errors which are of an unusual and special sort are of such a type that the correct kind of remedial work baffles one *at any*

TABLE I

SUGGESTED REMEDIAL PROGRAM FOR THE FOUR FUNDAMENTAL PROCESSES

FOR UNSATISFACTORY WORK IN	FOR LOW SCORES ON		USE REMEDIAL CARDS NUMBER
	Test	Part	
ADDITION OF WHOLE NUMBERS	I		
Basic addition facts		1	1
Higher-decade addition facts		2	2, 3, 4
Column addition		3	2, 3, 4, 5
Carrying in column addition		4	5, 6, 7
Checking answers in addition		5	7
SUBTRACTION OF WHOLE NUMBERS	II		
Basic subtraction facts		1	26
Harder subtraction		2	26, 27, 28, 29, 30, 31
Checking answers		3	
Finding errors		4	26, 27, 28, 29, 30, 31
MULTIPLICATION OF WHOLE NUMBERS	III		
Basic multiplication facts		1	51
Additions used in the multiplication of Parts 4, 5, and 6		2	1, 2, 3, 4, 52
Carrying in addition used in the multiplication of Parts 4, 5, and 6		3	52, 53, 54, 55
Fundamentals of multiplication		4	56, 57, 58, 59
Checking multiplication		5	
Finding errors		6	56, 57, 58, 59
DIVISION OF WHOLE NUMBERS	IV		
The vocabulary of division		1	
Fundamentals of short division		2	76, 77
Short division with carrying		3	78, 79, 80, 81, 82
Mult., Add., Subtr. used in division in Parts 2, 3, 4, 5, and 6		4	1, 26, 27, 28, 29, 30 31, 51, 52
Estimating first quotient figures		5	88, 89, 90, 91
Fundamentals of long division		6	83, 84, 85, 86, 87, 88 89, 90, 91, 92
Finding errors in long division		7	

time. To medicinal science some diseases are still incurable, and in arithmetic there are some things not yet well understood.

Tool 8: The textbook.—The textbook itself is a major tool of supervision. Eventually, it will not be one document; the course of study, another; and the curriculum, a third. Supervisors will

agree to the economy in having a text which is itself the course of study. If no text at present is worthy of such use, the move for the supervisor is not to complicate the game with more tools, but

TABLE II

TIME REQUIRED FOR OBJECTIVE SUPERVISION

TOOL	PUPIL'S TIME	TEACHER'S TIME	SUPERVISOR'S TIME
1	Grades III, IV, V 20 minutes Grades VI, VII, VIII 25 minutes	No class preparation Giving answers 5 minutes	No time
2	Helping to fill in Class Diagnostic Chart 5 minutes	Use of Diagnostic Chart and Class Progress Chart Study of individual need 10 minutes	No time (occasional inspection)
3	No time	To make report 3 minutes	To study report 2 minutes per class
4	No time	No time	Permanent record of teaching data 3 minutes per class
5	No time	To study report 3 minutes	To supply direction for class or individual pupils 5 minutes per class
6	Class 3 hours per year. Individuals as needed	Giving, correcting, and studying scores 45 minutes per week	Study of test scores Decisions on such study Time included in 3, 4, and 5
7	Class as needed. Individuals as needed	Administered as: regular class work or individual projects	Detail of sending material 5 minutes per class
8	As always	As always	Editing as preventive work 30 hours per year

rather insist that better texts be made. He should be a master of his text and train his teachers in the proper use of it.

Textbooks should be edited by supervisors whenever the need for deletions or additions of material is evident. When from a

study of the control chart (Tool 4) and from the scores on diagnostic tests, it becomes apparent that certain sections of the text inadequately provide the needed instruction, the supervisor should supply better material to supplement the textbook.

While the writer reserves the right to reverse his opinion if further study should suggest it, he is inclined to think that for most teaching situations an edited text will operate better in most classroom situations than attempts really to use a printed curriculum and a text as separate tools for daily teaching. A supervisor who will supply a plentiful series of directive suggestions keyed directly to the text will probably help most teachers more through this device than any other. The author holds that supervisors should translate their suggestions into classroom material, and notes referring directly to the text seems the best way to do this work.

PREVENTIVE VERSUS CORRECTIVE SUPERVISION

The suggesting of an important emphasis for remedial work is in order here. Suppose a rather general breakdown in long division occurs in Grades V and VI. The first thing to do is to assign remedial work which will assist the pupils concerned to increase their skills in long division. This is only a tenth of the job, however. The other nine-tenths is to investigate the other possible causes of the breakdown, such as inadequate text material, too brief time allotment, and ineffective classroom methods, and so to arrange matters that the danger of a similar breakdown in other years will be greatly lessened. The most important aspect of remedial work is sagacious preventive work which can best be done by the use of the type of data provided by weekly inventory drills and competent diagnostic tests. The best vehicle for this kind of preventive work consists of notes keyed directly to the text, or body of teaching material, as a substitute for the text. Supervisors who spend most of their time and energy on sick pupils instead of cleaning up the situations which cause the sickness miss the crucial opportunity in objective supervision.

Have supervisors time to use objective techniques?—The objections to the general aspects and to the details of this plan of supervision are legion. Probably the time factor is the one which would be most quickly mentioned. In Table II are listed the maximum

allowances of time needed for the operation of the integral parts of the system. In making this time schedule it is assumed that the supervisor has previously mastered the system and has become an expert in the use of his tools. Such previous preparation will take about fifty hours of intensive study. Whether this is an undue amount of time to require for preparation for arithmetic supervision must be decided by the supervisor himself.

SUGGESTIONS OF CONTROL MADE POSSIBLE BY OBJECTIVE METHODS OF SUPERVISION

The questions about the production of arithmetic listed below are analogous to questions which could be answered by administrative officers relative to finance. Casual supervision could not answer these questions; supervision using objective techniques could.

1. What is the status of long division in the sixth-grade classes in your schools?

A weakness in long division in any sixth-grade class would be reported to the supervisor weekly through the use of Tools 1, 2, and 3.

2. In the fifth grade of School X which pupils are in need of special attention and on what skills is diagnosis needed with these pupils?

Tool 3 will give this for any week. Names which recur week by week on Tool 4 will show the persistence of this need.

3. What topic is now the main item in the arithmetic work of Grade VII in School Y? When will this topic probably be finished?

Tool 3 will report these facts.

4. The fourth grade of School Z is having trouble with carrying in multiplication. What specific help can you give?

Tool 7 if kept in efficient working order will enable the supervisor to supply proper aid with a minimum expenditure of time.

5. Which eighth grades possess the least general competence in the fundamentals of arithmetic?

A study of the class's average ratings made weekly on Tool 1 and reported to the supervisor weekly on Tool 2 will give this fact at a glance.

6. There is a breakdown in the multiplication of fractions in the sixth grade of School R. What can be done about it?

A competent use of Tool 6 will show whether a thorough reteaching is called for or whether the weaknesses are specific and certain units of remedial work are the proper treatment.

7. What units of initial instruction should be improved?

Tool 1 grade by grade will reveal the relative efficiency of the first teaching of any topic. Where need for better first teaching exists Tool 1 will locate that need.

8. Who are your best arithmetic teachers? Who are those that do not need your close supervision?

The teacher's weekly suggestions on Tool 3 will show the supervisor the thoroughness of each teacher's grasp of the situation in arithmetic. This provides an objective method of rating and rewording good teaching, an advantage which need not be discussed here.

Questions such as these suggest that it is possible so to supervise arithmetic through the use of proper tools that precise and useful knowledge will be available at the times such knowledge can be put to the most effective use.

Such types of supervision, complex and confusing as they appear in compact discussion, are as a matter of fact simple, clean cut, and labor-saving. They produce not only better arithmetic but they also facilitate that high type of leadership which teachers welcome and in their hearts respect. Such supervisory techniques also give to the supervisor a definiteness and clarity of aim and method which joy in his own work and respect for his own work very significantly increase.

GRADE VOCABULARIES

EDWARD WILLIAM DOLCH
University of Illinois

FOR some time it has been apparent that the work of the school could be made much more efficient if we knew what words constituted the vocabulary of most children in Grades I through VIII. Classroom teachers, as well as educational specialists and book publishers, have felt keenly the problem of suiting texts and reading books to the word knowledge of the children and have been wishing for some reliable data to help them. It is in answer to this need that Horn prepared his first-grade list, published in the *Twenty-fourth Yearbook of the National Society for the Study of Education.* There remained, however, seven upper grades with an ever-enlarging field of word knowledge. It is true that there are a number of studies of the words in children's writing throughout the grades, but, since these were made to secure spelling lists, they yielded such small groups of words as to be quite inadequate in depicting what the vocabularies of the children really include. Thorndike's extensive study gives only the usage of reading-matter and not the words of children doing the reading. The two correlate highly, no doubt, but are not identical. Likewise, the Thorndike list is not graded. It shows us frequency of occurrence, and, though this frequency doubtless correlates somewhat with grading, again it is not fully satisfactory.

Realizing the importance of the problem, a large publishing house expressed willingness to subsidize an extensive word-study with the purpose of determining as nearly as possible what words children did know as they progressed from Grades II through VIII. The schools willingly cooperated because they also realized the educational value of the work.

The problem then arose as to what type of original data should be secured. Previous studies had used oral or written compositions by children. This method has the great drawback of limiting the field of association within the children's minds. Even if many subjects are assigned there can be no hope of completely covering the children's experiences. If they are allowed to choose their own sub-

jects, their choice is certain to be controlled by school surroundings and other kinds of limiting suggestions. As soon as any subject is selected, it immediately restricts association to a quite narrow field.

To overcome this difficulty, Dr. B. R. Buckingham proposed that the free-association method be employed, that is, the method of having the children write any words which come to their minds in a designated period. In this situation, the suggestions of school surroundings, recent lessons, and the like, also operate, but such sources are soon exhausted and the train of associations wanders over all the available material—the whole of a child's experience. Of course, the wandering is in accordance with certain principles, which we need not discuss here, but there is a chance for a wide

TABLE I

NUMBER OF WORDS WRITTEN FOR THE FREE-ASSOCIATION STUDY

	Number of Children	Average Words per Child	Total Words per Grade
(1)	(2)	(3)	(4)
Grade II	2,071	73	149,228
Grade III	2,208	90	198,720
Grade IV	2,350	140	329,000
Grade V	2,335	155	361,925
Grade VI	2,360	164	387,040
Grade VII	2,430	172	417,960
Grade VIII	2,452	191	168,372
Total	16,206	.....	2,312,245

range of material to appear. The free-association method seemed to have unusual merits for our purpose.

Another requirement was to secure enough children to equalize, if possible, variations in individual environments. A third desirable feature was to secure children from different localities. These were obtained in large measure. About half the data came from small towns in Illinois and the remainder from different sections of New York and Brooklyn. The work of 16,206 children was used, giving a total of more than 2,312,000 words. These were distributed through the seven grades beginning with Grade II, as shown by Table I.

Although the numbers of children in each grade were about the same, the different amounts written by the children result in a

considerable difference in the data for the different grades. As it turned out, this increase in material grade by grade was a good thing, because each of the later grades naturally repeated most of the words of the earlier ones. Therefore, more and more running words had to be handled to discover new words.

Since the children wrote down words in all sorts of forms, rules for tabulation had to be decided upon. Those used by Thorndike and given in the introduction to the *Teacher's Word Book* were also used. These were:

> Except for special reasons, separate entries are not made for (1) plurals in *s*; (2) plurals where *s* is replaced by *ies*; (3) adverbs formed by adding *ly*; (4) comparatives and superlatives formed by adding *er* and *est*, or *r* and *st*; (5) verb forms in *s*, *d*, *ed*, and *ing*.

These rules practically mean that the regular inflectional forms were combined into one form for the noun, one for the verb, and one for the adjective and adverb. Irregular inflectional forms were kept as separate entries.

Several classes of words recorded in the *Teacher's Word Book* were not recorded in this study. These were proper names, abbreviations, contractions, and archaic or poetic verb forms. It was felt that proper names in themselves present a problem quite apart from the other words of the language. Abbreviations and contractions are not essentially different, except in form, from the words from which they are derived, nor are the archaic verb forms new words. It may be pointed out that the *Teacher's Word Book* contains six hundred proper names, not including those cases in which the same spelling may also be a common noun. With this deduction, the *Teacher's Word Book* contains not ten thousand words, but ninety-four hundred. To deduct the abbreviations and contractions would reduce the number eighty-eight more.

After the 2,728 different words written by second-grade pupils had been recorded, with their frequencies, it became necessary to decide which of these would be accepted as definitely located in Grade II. It was thought that the soundest method was the one used with all new types of data—evaluation by the best already known. The question then became: What frequency will place in Grade II the words which, according to existing standards, belong

there and exclude the words which do not belong there. By "existing standards" we mean previous studies and experienced judgment.

In order to apply these standards the words that had appeared once, twice, three times, and so on were listed in separate groups. These groups were then looked up in other word-studies and considered by experienced judges. It immediately became evident that any high frequency would place only a few of the words in Grade II, and would transfer many which clearly should be in that grade into higher graded lists. It was also evident that to include *all* of the words would put on the lists many words that individual children happened to be familiar with, but which were not characteristic of the second grade. Careful study seemed to show that the best compromise between the difficulties was to accept a frequency of two to place words in the grade. On this basis, 1,964 of the 2,728, or 71 percent, were considered second-grade words.

The large number of words used only once points out the chief characteristic of the free-association method, that it permitted the children's minds to wander very widely and freely. Consequently, the overlapping or repetition became very much less than would occur by any other method. This wide range of material was one of the things specifically aimed at, but much repetition could not be expected or insisted upon. A study of the words showed that wide range did not mean the introduction of much strange or unusual material. Anyone can test the matter out for himself. If he sits down to write all the words he can think of, he will find that very few which are not quite common and familiar will occur to him. This follows strictly the psychological law of habituation. Therefore, if even two children in their free mental "wandering" struck upon the same word, the chances were high that it represented the familiar experience of many children of their grade.

This frequency was used throughout the tabulation. No matter at what grade a word first appeared, it was graded at the point at which it reached this frequency of two. Of course this frequency does grade some words too low, but any higher frequency would have graded a much greater percent too high. Table II which presents a summary of the tabulation shows, we believe, that the limitation adopted was the best.

Table II presents many interesting points. It will be recalled from Table I that the total number of running words increased grade for grade, until Grade VIII had three times the quantity of Grade II. The row of figures at the bottom of Table II shows that little difference occurred in the number of new words which appeared in each grade. Column 9 shows that the number of words reaching the frequency of two approximated each other in the seven grades.

TABLE II

SUMMARY OF GRADING OF WORDS IN THE FREE-ASSOCIATION STUDY

	Number of Words Which First Appeared							Totals
	In Grade II	In Grade III	In Grade IV	In Grade V	In Grade VI	In Grade VII	In Grade VIII	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grade II	1,964	.....	.....	.....	.....	.....	.....	1,964
Grade III	501	678	.....	.....	.....	.....	.....	1,179
Grade IV	62	200	660	.....	.....	.....	.....	922
Grade V	82	271	397	528	.....	.....	.....	1,278
Grade VI	30	115	154	387	654	.....	.....	1,340
Grade VII	18	65	78	200	477	683	.....	1,521
Grade VIII	15	33	44	73	213	461	540	1,379
Total number of words graded	3,672	1,362	1,333	1,188	1,344	1,144	540	9,583
Words appearing only once	56	122	162	246	459	762	1,232	3,039
Grand totals	2,728	1,484	1,495	1,434	1,803	1,906	1,772	12,622

Thus there was a steady increase of new words in each grade and a steady increase of graded words, but some were graded as soon as they appeared and others not until several grades later. In fact, an interesting feature is that, after Grade II, only about a third of the new words were used two or more times in the grade that added them to our lists. Reading vertically in Table II, the first number beneath the number of new words in a grade tells how many were used two or more times and therefore were placed on that grade list. The numbers still further below tell how many words reached a frequency of two in succeeding grades, as indicated by reading horizontally to the left. For instance, fifteen

words which appeared first in the material of Grade II did not appear again until Grade VIII. Another rather odd fact is that almost a fourth, or 3,039 of the total, 12,622, never did occur more than once. Even fifty-six words used by second-grade children were never used again in the more than two million running words that were subsequently tabulated.

The totals arrived at for each grade, as shown by the Column 9, agree rather curiously with various estimates of children's vocabularies. A number of such estimates and studies have been brought together by Thorndike.[1] A number of these seem to indicate a total

TABLE III

FREE-ASSOCIATION LIST AND OTHER WORD STUDIES

	Number	On No Other List	On at Least One Other List	
			Graded	Not Graded
(1)	(2)	(3)	(4)	(5)
Grade II	1,964	106	1,709	149
Grade III	1,179	129	843	207
Grade IV	922	67	666	189
Grade V	1,278	204	698	376
Grade VI	1,340	363	484	493
Grade VII	1,521	562	349	610
Grade VIII	1,379	696	138	545
Total	9,583	2,127	4,887	2,569

of three thousand for Grade III, which would be just about the sum of our vocabularies for the second and third years. For the whole eight grades, Thorndike concludes in his summary that the figure should be about ten thousand, and it is 9,583 in this study.

The data described up to this point are obviously of great value, for they represent the actual work of so many children and the careful tabulation of a great amount of material. By comparison with other word studies, still more was found out about the words procured by the free-association method. Fourteen of the most prominent of these other studies had already been combined into a list, as will be described in a later article. With this combined

[1] "The Vocabularies of School Pupils," *Contributions to Education*. J. Carleton Bell (ed.). Chicago, World Book Company, 1924. I, 69-76. (Publication of New York Society for the Experimental Study of Education)

list, the words of the free-association list were checked. Some of the other lists had been graded according to children's usage and some had not, but this fact was taken into account. The comparison which was made yielded the facts shown in Table III.

To consider first the totals of the four columns, it will be seen that almost one-fourth of the free-association list, or 2,127 words, appeared in no other list, not even in that in the *Teacher's Word Book*. This was to be expected since the method used permitted the children to cover their experience in a way not permitted by the usual device of having them write compositions.

In addition, the fact that more than sixteen thousand children cooperated gave a wider range than other studies were able to secure. A second interesting fact is that slightly more than one-half of the total, or 4,887 words, had appeared in some other study of children's usage. The remaining fourth, or 2,569, had appeared in word lists graded by frequency rather than usage or in lists made from adult writing or printed matter. Most of these 2,569 words are duplicated only in the Thorndike list.

A glance down the columns shows a tendency which would be expected. In the early grades there is high correspondence with other lists, especially lists graded by children's usage. The further down we go, the greater the proportion of words on non-graded lists (which generally means Thorndike's) and the greater the proportion of words on this list alone.

This change from grade to grade points out a characteristic of vocabulary—and of human experience—which must be remembered by students in this field. Let us imagine each individual's vocabulary or experience as represented by an area such as a circle. How then would the condition of overlapping be pictured? With young children it seems that these circles would have a high percent common to all, a much smaller percent common to a smaller group and a very small percent of each circle overlapping no other. As the children grow older these "areas of experience" enlarge. The central common area increases in actual size but not proportionately. Though still overlapping in the center of the field, the individual vocabularies stretch out in all directions and altogether would include, if a total count could be made, an enormous number of words. This study, for instance, procured more than twelve thousand words

and found one-fourth of these used by only a single individual. Other word studies have all pointed out the same thing, that the older the individuals whose vocabularies are studied, the wider the scattering of experience. The size of the central core or common element in our experience does increase, but not nearly so much as was formerly thought the case.

Since this view of the matter has been suggested, another possible angle may be pointed out. The smallness of the common element in vocabularies may be because the study is concerned with the words used rather than with those understood. If methods could be employed to determine the number of words that individuals know the meaning of, regardless of whether they ever have occasion to use or even to think of using them, a somewhat different situation might exist. On this point, however, there are no data.

A still further branch of this study was a comparison of the grading of words by the free-association study and by other studies that had followed children's usage. This meant a consideration of only half the total number of words—4,887—but this number is larger than that of any single one of the other word-studies employed. The grading given by other word-studies was assumed to be the lowest assigned by any one of them. The results of the comparison are shown in Table IV.

This table must be interpreted in several parts. First it is easily explained why 74 percent of the words in Grade II are higher on this list than on others. This study began with Grade II and included practically all the words which Horn placed in Grade I. Therefore, this study necessarily graded these words higher.

There is not an equally clear reason why, in the Grade III as many as 47 percent should have been graded higher by this study than by others. Aside from Horn's list, there were only two that could have placed words in lower grades. One was the Jones' list which places close to two thousand words in Grade II. Although our study graded 1,964 in Grade II, a good many from the Jones' list did not appear until a grade higher. The other possibility is that the Pearson-Suzzalo list which states, "these words have been graded on the basis of their use by children in written composition," may have listed words in Grade II which were not found until the following grade.

Grades IV to VI show the free-association study uniformly grading a much larger percent of words low than high. This is the result that was to be expected because of the way the data were secured. The words did not have to be used in self-expression, as they did in other studies based on children's composition. Any words which came to mind by any processes of association were listed. One would naturally expect that by this system words would be likely to appear earlier than by the other.

The last two grades show only small groups and most of these are graded higher by this study. The reason seems to be that the common elements of other lists had already been exhausted. There

TABLE IV

GRADING BY FREE-ASSOCIATION STUDY AND BY OTHER STUDIES THAT FOLLOWED CHILDREN'S USAGE

	Number in Other Graded Lists	Percentage Comparison with Lowest Grade on Any Other List		
		Lower	Same	Higher
(1)	(2)	(3)	(4)	(5)
Grade II	1,709	18.6	7.1	74.1
Grade III	843	41.2	11.5	47.3
Grade IV	666	62.0	12.0	25.6
Grade V	698	55.4	16.3	28.1
Grade VI	484	60.7	16.5	22.7
Grade VII	349	22.0	37.5	40.4
Grade VIII	138	.....	16.6	83.3
Total	4,887	.....	.....	.....

remained, however, the relatively unusual words of which any study is bound to include a few. Because of the larger mass of material gathered in the free-association study, many of these words were graded later on, even though they had been graded earlier in another investigation.

On the whole, it was to be expected that this study would give lower grading for two reasons. The first, already mentioned, is that the method of free association was more likely to call words to children's minds than the writing of compositions. The second is that other investigations purposely limited the total number because they wished a spelling vocabulary of convenient size. They chose a frequency limit that would cut the list to that size. Consequently,

many very common words did not have a chance to reach this frequency until one or more grades beyond the point where they first appeared.

When one considers that it is quite commonly estimated that third-grade children know three thousand words, it will be seen that lists of from three to four thousand words derived in order to construct spellers for all the grades are bound to place the greater portion of the words higher than the grade in which the children first know the meanings. The spelling studies therefore give what might be called the "relative grading" of words. Their words in Grade III are sometimes known later than their words for Grade II, but as a matter of fact, all their words are likely to be known a grade or two earlier than the ones they are listed for. In contrast, this study placed no limits upon size of the vocabulary. It sought rather the "true grading" of the words. This difference, which resulted from limiting or not limiting the size of the list, is of fundamental importance in its effect upon the locating of the words.

In conclusion, we must call attention to a point clearly shown by Table IV but not as yet referred to. It is the inevitable disagreement between statistical studies in such a field as this. No matter what method is used in assembling the original data there are always the influences of different locality, of different school subject-matter, and of chance groupings of children. No method can completely neutralize all of these. Grading therefore means "about Grade III," or "about Grade VI." It would be foolish to attempt to be absolutely definite upon this point, and no greater definiteness than this is necessary nor is claimed by this study.

SUMMARY

To determine the vocabularies of the different grades, 16,206 children were asked to write all the words they could think of in fifteen minutes, thus supplying a total of 2,312,000 words. The rules for recording forms were practically the same as those used by Thorndike for the *Teacher's Word Book*, which meant practically one form only for the nouns, one for the verb, and one for the adjective and adverb. Proper names, abbreviations, contractions, and archaic or poetic verb forms were not recorded. On this basis, 12,622 different words were procured.

A frequency of two was decided upon for placement of words in grades, since this frequency seemed to give a placement which other studies and experienced judgment verified as true to the actual facts. Using this frequency, 9,583 words were graded, since 3,039 words appeared but once. The large number of different words and the large number used only once were due both to the free-association method and to the size of the group of subjects. The total number graded and the number in each grade agree quite well with various estimates of children's vocabulary.

Comparison with fourteen other word studies shows about one-fourth of the 9,583 words on no other study, about one-half on other studies graded by children's usage, and the remaining fourth on lists graded by frequency or made from adult writing or printed matter.

Comparison of grading by this study and by others following children's usage indicates that in general the grading in this case is lower. This was to be expected because of the free-association method used.

Disagreements found between this and other studies of children's usage point out the fact that grade lists cannot hope to do more than locate words approximately, and this is all this study attempts to do.

INTEREST AND ABILITY IN EDUCATIONAL GUIDANCE

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THIS investigation is a study of the relationship between interest and ability in educational subjects. Ability is measured in two ways, first as estimated by the student and second as based upon school grades. As an allied problem the relation of the student's estimates of ability to school grades has been measured.

In their application to the practical aspects of educational guidance or adjustment, the problems of the investigation may be stated in the form of questions as follows: (1) Is an individual's expression of educational interests predictive of ability in educational subjects? Does an individual feel most interested in the subject in which he has the greatest ability? (2) Are the individual's estimates of ability in educational subjects predictive of ability in these subjects as measured by school grades? Does an individual think he has the greatest ability in the educational subject in which he receives the highest grades?

EARLY INVESTIGATIONS

E. L. Thorndike first[1] asked 100 and afterwards[2] 344 college students to rank seven educational subjects in the order of interest, first, as the subjects appealed to them in the elementary school; second, as they appealed to them in the high school; and, third, as they appealed to them in college. The students were also asked to rank these educational subjects in the same manner according to their ability in the subjects. The following central tendencies of correlations between the individual's rank of abilities and rank of interests were reported:

	100 Students	344 Students
Elementary school	+.89	+.89
High school	+.89	+.89
College	+.89	+.89

[1] Thorndike, E. L. "The Permanence of Interests and Their Relation to Abilities." In Bloomfield, Meyer (ed.), *Readings in Vocational Guidance*. New York, Ginn and Company, 1915. pp. 386-95.

[2] Thorndike, E. L. "Early Interests: Their Permanence and Relation to Abilities," *School and Society*, 5:178-79, February, 1917.

Another study of the relation of educational interests to educational abilities is that of Bridges and Dollinger[3] in which five hundred college students were asked at the beginning of the semester to rank their college courses, first, according to their interest in them; and, second, according to their ability in them. At the conclusion of the semester the students' grades in these courses were procured and the following correlations by means of Pearson's formula for mean square contingency were reported: (1) between rank in interest and college grade, +.25 (256 cases); (2) between rank in interest and estimated rank in ability, +.57 (291 cases). These correlations by the method of the mean square contingency are lower than they would be by the product-moment method.

In the first correlation reported by Bridges and Dollinger, the relationship is between the individual's rank of a subject in interest, in relation to other subjects, and the college grade, which is the rank of the individual student in comparison with all other students in that subject. These two factors are not comparable. Thorndike has evaluated this study,[4] computing the correlations, for 140 random cases, between the individual's rank in the courses according to interest and the rank of the college grade in this course in relation to other courses taken by the student. A central tendency of correlations by this method is reported as +.46. For the same 140 cases the central tendency of correlations between ranks in interest and ranks in estimated ability is +.70.

Thorndike contends that interest is highly predictive of ability. In support of this theory he has, as we have seen, made two successive reports on data obtained by the same method, the latter verifying the former exactly. The correlations, all of +.89, show a high degree of resemblance between interest and ability in educational subjects as estimated by the student. The coefficient of alienation for this correlation is .46, which indicates a predictive value 54 percent better than a pure guess. This is high predictive value, as relations in mental measurement run, more than 50 percent better than chance would allow.

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[3] Bridges, J. W., and Dollinger, V. M. "The Correlation between Interests and Abilities in College Courses," *Psychological Review*, 27: 308-14, July, 1920.

[4] Thorndike, E. L. "The Correlation between Interests and Abilities in College Courses," *Psychological Review*, 28: 374-76, September, 1921.

As already indicated, Thorndike finds from the data of Bridges and Dollinger correlations of +.70 and +.46. Prediction on a correlation of +.70 is 29 percent better than chance and prediction on a correlation of +.46 is only 11 percent better. This is a risky

TABLE I

THE RELATION OF INTEREST AND ABILITY
(Thorndike Method)

Description of Correlations	Elementary School			High School			College		
	Number of Cases	Correlations		Number of Cases	Correlations		Number of Cases	Correlations	
		Median	Middle 50 Percent		Median	Middle 50 Percent		Median	Middle 50 Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I. Interest and estimated ability (all cases).....	68	.85 ±.02	.70 to .90	68	.86 ±.02	.70 to .94	45	.89 ±.02	.68 to .94
II. Interest and estimated ability (same cases as in III and IV)..	24	.85 ±.04	.73 to .94	28	.89 ±.03	.75 to .94	14	.82 ±.07	.....
III. Interest and ability according to school marks....	24	.63 ±.09	.37 to .80	28	.60 ±.08	.03 to .79	14	.80 ±.07	.....
IV. Ability (school marks) and estimated ability....	24	.70 ±.07	.38 to .79	28	.61 ±.08	.26 to .79	14	.70 ±.10	.....

basis. Thorndike argues, however, that the +.70 correlation is a "truer fact" than the +.46 correlation when the chance errors in grades are considered and that the real correlation "between interest and ability will surely rise considerably above +.70." In this manner he dismisses the problem with the conclusion that a much higher relationship exists than is indicated here and that the

true relationship is approximately as stated by the correlations which he reported earlier.

TRIAL OF THORNDIKE'S METHOD

A trial of method exactly as used in Thorndike's original investigation, with the addition of a request for school grades, was carried out upon two groups of college subjects in the University of Utah in 1923-24. The first group was composed of fifty-one Sophomores and Juniors, and the second group, of twenty Freshmen. Table I shows the median correlations by the Spearman rank method for the different relationships shown at the left. Since the results for each group were rather closely similar, the entries in Table I are for both groups combined. The twenty Freshmen, however, afforded insufficient data for the working out of relationships for college expressions. Since the majority of all the students had not been out of high school much more than a year, the high-school relationships undoubtedly form the most accurate measures. Nevertheless, the close agreement between the high-school, the elementary-school, and the college relationships will be noted.

These correlations verify the relationship of +.89 established by Thorndike between educational interests and estimates of ability. For all the students there is a median correlation of $+.85 \pm .02$ for elementary-school expressions, $+.86 \pm .02$ for high-school expressions, and $+.89 \pm .02$ for college expressions. Moreover, the reliability of these measures is indicated by the fact that the data for the two groups of students taken separately—not shown here—agree almost exactly.

The relationships between educational interests and abilities as shown by school grades, however, are considerably lower and insufficient for purposes of prediction. In the combined group there is a median correlation for grammar-school expressions of $+.63 \pm .09$ and for high-school expressions of $+.60 \pm .08$. The deviations from the medians are wider here as shown by the middle 50 percent of correlations. The number of cases is small in both instances, but the reliability of the larger sample is suggested as applying to this smaller group by the fact that the relationship between interest and estimated ability remains the same (compare Lines I and II of Table I).

CRITICISM OF THORNDIKE'S METHOD

The purpose of this trial of Thorndike's method was not mainly to contribute additional data to those already accumulated. It was to study a method which appeared on the face of it to be open to question. This study has brought to light several uncontrolled influences which enter into the results.

There is found here a somewhat higher median of correlations (+.60) between interests and school grades than that found by Thorndike in reworking the data of Bridges and Dollinger (+.46). Indeed, for the college expressions the median correlation is still higher, but in this case the number of students is too small to deserve much consideration. Bridges and Dollinger collected their data without requiring the students to classify their interests and estimates of ability into groups. In the use of Thorndike's method the individual is limited in his selections of expressions to seven educational subjects. These are mathematics, history, literature, science, music, drawing, and other handwork. Accordingly, the student must classify additional subjects under these seven heads. This difference in method would appear to be an influence causing the higher correlation given above, and this in turn suggests that the Thorndike method predetermines a higher correlation when applied to the collection of any data.

The coincidence of the six identical correlations reported by Thorndike is surprising and immediately raises the question of cause. There is an indication that some common influence was a determining condition, and from various angles there is the suggestion that the method of collecting the data may have been this influence. The correlations reported by the writer are close enough to bear out this supposition.

Since the request for interest and ability expressions were called for at the same time, it would seem that one judgment might affect the other. King and Adelstein[5] used Thorndike's method in the study of the relations of interest and ability with this condition changed. The ranking of interest and ability was done upon two different occasions. Median correlations for 140 University of

[5] King, Irving, and Adelstein, Morris. The Permanence of Interests and Their Relation to Abilities, *School and Society*, 6:359-60, September 22, 1917.

Iowa students between the individual's rank of educational abilities and rank of educational interests were reported for three periods:

Elementary school	+.73
High school	+.79
College	+.73

These coefficients are about one point lower than those by Thorndike's method as originally used and this change, removing a possible influence tending to raise the correlation, may have been the cause.

Another unknown influence upon the results lies in the procedure of stating the school subjects to be ranked by the student. In other investigations it has tended to increase the correlation. Here too it may have done so. Still another unknown influence is added, due to the fact that the seven groups of subjects used by Thorndike, while representative of the elementary-school curriculum, are not so representative of high-school and college curricula. All of this raises the question of the validity of Thorndike's method; and upon the validity of this method rests Thorndike's theory that interests are highly predictive of ability.

PRESENT INVESTIGATION

At the University of Utah in 1923-24 a study was made of a group of 61 Freshmen and Sophomores, largely women, and of a group of 43 Sophomores and Juniors, made up of about equal numbers of men and women. In this investigation no limitation, other than of number of choices, was placed upon the formation of the list of educational interests or estimated educational abilities. Assignments requesting elementary-school expressions, high-school expressions, and college expressions were made at intervals of three days. For example, the student was asked to spend ten minutes thinking of himself as a grammar-school student and then to rank, first, the five subjects which interested him most and, second, the five subjects in which he thought he had the greatest ability. Similar expressions for high-school and college experience were obtained. At a later date, school grades were requested for elementary school, high school, and college. The 61 Freshmen and Sophomores, however, omitted the college assignments. Table II is a summary of the results from these Utah students. Again as in Table I the entry, "Interest and estimated ability" (same cases as used in III

and IV) is given as suggestive of the reliability of the smaller samples in relation to the larger. The correlations shown on Line IV, "Ability (school marks) and estimated ability," will be discussed in a later section.

Table II will be discussed in relation with Table III which consists of results secured by means of a further refinement of method.

TABLE II

THE RELATION OF INTEREST TO ABILITY

(Utah Students)

Description of Correlations	Elementary School			High School			College		
	Number of Cases	Correlations		Number of Cases	Correlations		Number of Cases	Correlations	
		Median	Middle 50 Percent		Median	Middle 50 Percent		Median	Middle 50 Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I. Interest and estimated ability (all cases).....	104	.57 ±.04	.25 to .84	104	.70 ±.03	.37 to .90	43	.60 ±.07	.23 to .89
II. Interest and estimated ability (same cases as in III and IV)..	47	.57 ±.06	.20 to .80	50	.70 ±.05	.36 to .90	30	.65 ±.06	.31 to .90
III. Interest and ability according to school marks....	47	.10 ±.09	−.25 to +.35	50	.33 ±.09	−.03 to +.72	30	.28 ±.11	−.10 to +.77
IV. Ability (school marks) and estimated ability....	47	.28 ±.09	−.03 to +.54	50	.54 ±.07	.14 to +.77	30	.47 ±.09	.18 to .89

While in the investigation of which Table II is a summary the elementary-school, high-school, and college periods were separated in the requests for information, the requests for interest expressions and estimated ability were made at the same time. All assignments were separated and requested at intervals of several days in a supplementary investigation involving 89 male sophomore and junior

students in New York University. This change in method seems not to have materially affected the results, however. In addition, in gathering the data from these New York University students other possible causes of errors were avoided. This final investigation, therefore, the results of which are summarized in Table III, is the most exact observation, methodologically, upon the problem of the relation of educational interests and educational abilities.

TABLE III

THE RELATION OF INTEREST TO ABILITY
(New York University Students)

Description of Correlations	Elementary School			High School			College		
	Number of Cases	Correlations		Number of Cases	Correlations		Number of Cases	Correlations	
		Median	Middle 50 Percent		Median	Middle 50 Percent		Median	Middle 50 Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Interest and estimated ability	89	.60 ± .05	.36 to .80	81	.66 ± .04	.26 to .83	86	.61 ± .05	.25 to .77
Interest and ability according to school marks	.....	.....	.....	44	.39 ± .06	.05 to .60	.....	.....	.....
Ability (school marks) and estimated ability	.....	.....	.....	41	.52 ± .08	.23 to .75	.....	.....	.....

The Spearman rank method has been used in the analysis of all data. The method devised for obtaining the data often led a student to name different educational subjects in his two lists. This was a part of the plan to allow complete freedom to the individual in making up his list of subjects of greatest interest or greatest ability. Occasionally as many as three different subjects were found in two lists to be compared, but usually not so many. In the statistical treatment the extra subject, or subjects, not found in both lists was given the next highest rank in the opposite series of subjects, which is the best possible position it could have held. This procedure would tend slightly to increase the correlation between interest and ability.

The results secured from the eighty-nine New York University students verify those derived from these Utah students almost exactly. For "Interest and estimated ability," the following table shows the median correlations:

	Utah Students	N.Y.U. Students
Elementary-school expressions	.57 ±.04	.61 ±.05
High-school expressions	.70 ±.03	.66 ±.04
College expressions	.60 ±.07	.60 ±.05

On "Interest and ability (school marks)," the New York University students reported only concerning their high-school experience. The correlations for this factor, also, are very close. The median correlations are: Utah students, .33 ±.09; New York University students .39 ±.06. The inter-quartile range or middle fifty percent of correlations expresses the variability of the individual correlations between interest and ability. In the New York data for "Interest and estimated ability," the middle 50 percent of these correlations run as follows: elementary-school, +.36 to +.80; high-school, +.26 to +.83; college expressions, +.25 to +.77. In the Utah data the deviations from the median correlation are somewhat wider.

Measurements of relationships have been made for college, high-school, and elementary-school expressions. As to which of these is the best indication of the relation between interest and educational ability is a question of opinion. The results for these three periods, however, verify each other very well and herein lies their value. However, it seems probable that the results of the high-school expressions are of greatest reliability. They are less in retrospect than the elementary-school and sufficiently in retrospect to be more consolidated than the college expressions. In all instances it will be noted that the correlations between interest and ability are highest for high-school expressions.

RELATIONSHIP OF INTEREST AND ABILITY

The relationship between educational interests and estimated abilities as estimated by the individual himself is evidently represented by an average correlation not higher than +.70, which is the median correlation found in the evaluation by Thorndike of the data of Bridges and Dollinger. Correlations range from +.50 to +.70 for the separate samples as follows: +.50, +.59, +.60, +.60, +.61, +.66, +.66, +.70. The median of these is between

sixty and sixty-one, and the probability, judging from the data available, is that the usual average correlation would be about +.60. That for the New York University students on their high-school expressions is +.66. The higher correlation of about +.90 found by Thorndike between interest and estimated ability must be disregarded in view of the results obtained upon refinement of method.

The relationship between educational interests and abilities according to school grades is much lower. The average correlation found by Thorndike in reworking the data of Bridges and Dollinger was +.46. In the investigation here reported they run from +.04 to +.57. In the preliminary trial reproducing Thorndike's method all median correlations between interest and ability according to school marks are in the sixties. (The median correlation of +.80 of college expressions for 14 subjects is disregarded.) In these results, however, there was the influencing factor of a limited list of subjects for choice of educational interests.

It would appear from all available data that the relationship between educational interests and abilities as expressed in school grades is represented by average correlations between +.20 and +.40. Taking the high-school expressions for the New York University students as possibly offering the most exact data available, the median correlation is +.39. The median correlations available for this relation, including that of Bridges and Dollinger (Thorndike's evaluation) run as follows: +.04, +.12, +.12, +.28, +.39, +.46, +.57, for which +.28 is the median. We might then take +.30 as representing the average relationship between educational interests and abilities according to school grades. Whatever mathematical representation is taken for this relationship, it is not high.

Thorndike has argued that the relation between estimated ability and interest is nearer the truth than the relationship between ability, as measured by school grades, and interest. For ordinary high-school and college grades the writer would maintain the opposite view. School grades are the more generally accepted educational criterion. They are objective, and objective criteria are found to be more accurate as a rule. Considering the possibility of both being partially correct, the correlation between interest and ability would seem to reside somewhere between the two, about

+.45. The correlations between *vocational* interests and abilities are somewhat lower than this, although one would expect theoretically the relationship to be about the same in these two fields of expression. The correlations between vocational interests and abilities run from about +.10 to +.50, which is almost exactly the relationship found between educational interests and educational abilities according to school grades.

PREDICTIVE VALUE OF INTEREST FOR EDUCATIONAL GUIDANCE

Accepting the correlation between interest and estimated ability to be +.60, the coefficient of alienation is .80. This offers 20 percent better than a pure guess for the prediction of one's ability by one's interest, very low predictive value indeed for educational guidance. Accepting +.30 as the correlation between interest and ability (school grades), the coefficient of alienation is .95, offering only 5 percent better than chance for prediction.

The correlations indicating the relationship between interest and ability in educational subjects suggest a lack of understanding on the part of the individual of the best fields of ability expression. These relationships indicate that an individual's statement of his interest in an educational subject is not predictive of corresponding ability in that subject. Contrary to an earlier accepted theory, expressions of interest as criteria for educational guidance have been found in this investigation to be of little value.

These results appear to be conclusive. They are supported by similar results derived from investigations in the field of vocational expressions. However, further verification is considered desirable.[6]

[6] Two recent studies from a somewhat different approach support this conclusion. In the *Genetic Studies of Genius* (By Terman, L. M., and others, Stanford University, California, Stanford University, 1925. p. 368) coefficients of correlation between the achievement rank order of school subjects, determined by teachers' ratings, and the interest rank order of school for the following groups, are reported: gifted boys (110) +.44; gifted girls (99) +.18; normal boys (135) +.48; normal girls (127) +.55; average for group (471) +.41. M. Columba in "A Study of Interests and Their Relations to Other Factors of Achievement in the Elementary School Subjects" compared the educational achievement of 356 pupils according to whether or not they preferred a certain subject to other subjects of study. In the sixth and eighth grades the group preferring a certain subject are slightly superior to the remainder of the class. In the fifth and seventh they are slightly inferior. For all grades the average achievement quotients are 104.2 for the group preferring the subject and 102.8 for the remainder of the class, indicating a low but positive relation between interests and abilities.

But upon the basis of findings here reported a probability of between 5 and 20 percent better than a pure guess is indicated for the guidance of an individual, based upon his interest, in the study of the educational subject of his greatest ability. This is the predictive value of interest for educational guidance.

Everyday observation in guidance activities lends support to this conclusion, the conclusion, namely, that educational interests are not highly predictive of educational abilities; also that vocational interests are not highly predictive of vocational abilities, for what holds true in one field of expressions should hold true in the other. Of course, interest is suggestive of ability. Interest and ability are related in both the educational and vocational expressions. They have a positive correlation. This is not the point under discussion, however. The question is, are they closely enough related to enable us to predict accurately one from the other? The evidence indicates emphatically that they are not.

RELATION OF THE SUBJECTS' ESTIMATES OF ABILITY TO OBJECTIVE MEASURES OF ABILITY

An allied problem as to the relation of estimates by the student of ability in educational subjects to the measures of ability (school grades) has developed in this study. The data upon this relationship are summarized in Tables II and III.

Median correlations are reported as follows:

Elementary-school expressions		
Utah Students	$+.28 \pm .09$	(47 correlations)
High-school expressions		
Utah Students	$+.54 \pm .07$	(50 correlations)
N. Y. U. Students	$+.52 \pm .08$	(41 correlations)
College expressions		
Utah Students	$+.47 \pm .09$	(30 correlations)

Of these, the most exact measure methodologically is that obtained from the New York University students, offering a median correlation of +.52.

In all comparisons, the deviations of the individual correlations from the median correlations are extremely wide as shown by the middle fifty percent of correlations:

	Utah Students	N.Y.U. Students
Elementary-school expressions	$-.03$ to $+.54$	
High-school expressions	$+.14$ to $+.77$	$+.23$ to $+.75$
College expressions	$+.18$ to $+.89$	

THE PREDICTIVE VALUE OF ESTIMATED ABILITY FOR EDUCATIONAL GUIDANCE

The median correlation between estimated ability and ability as measured by school grades is about +.40, possibly +.50. The coefficient of alienation for the former is .92 and for the latter .86, which indicates low value for the prediction of school grades by estimated educational abilities. According to these correlations, there may be expected a prediction from eight to fourteen percent better than pure chance, which leads to the conclusion that ability as measured by school grades cannot be dependably predicted from the student's estimate of his ability in educational subjects. Estimated ability, along with interest, can be made a basis for guidance in a suggestive way, but prediction of ability by interest or estimated ability is very risky business according to the findings of this investigation.

There is a possibility of error in these tentative generalizations due to the method of collection of the data, which should be pointed out in conclusion. The interest expressions and estimated abilities were taken after the ability expression in the education subjects had been made and measured. In educational guidance the individual seeking guidance is asked in what subjects he is interested before pursuing the study of those subjects. Of course, to a considerable degree in most individual instances there is an informational foundation derived from the study of prerequisites. But exactly what the educational counselor wants to know is the predictive value of interest expressions and estimated abilities in educational subjects to be studied in the future. This has not been determined.

It must be said, however, that there is every reason to believe the correlations reported above to be higher, due to the students' knowledge of their school grades, than they would have been if these correlations had been obtained without the "knowledge of accomplishment" influence. In this statement the assumption is made that knowledge of success influences one's interests and estimates of ability in the direction of success and away from failure. This appears to be true, and if true the correlations would be lower under the real conditions of guidance. It would seem that the natural conditions of guidance would tend to lower rather than to raise the correlation.

A REPORT OF CERTAIN SIGNIFICANT DEFICIENCIES OF THE ACCOMPLISHMENT QUOTIENT

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MUCH has appeared during the past five years regarding the advisability of the use of the accomplishment quotient as a significant measure in educational research and school administration, but unfortunately little has been reported regarding the empirical success which has attended the use of this measure. Investigators have not had adequate data upon which to proceed with safety, and many educators have made use of the accomplishment quotient because of its apparent neatness without realizing some of the pitfalls into which they might be led. Unfortunately, the probable error of an accomplishment quotient cannot be computed from a knowledge of the probable errors of its component parts because of the difficulty of establishing the probable error of any ratio based upon two variables which are both influenced by chance fluctuations. It is the purpose of this report to present a survey of the use of the accomplishment quotient in the Los Angeles city schools over a period of several years and to explain why its use was finally discontinued.

The instructions which were issued to elementary-school counselors in Los Angeles during the time the accomplishment quotient was in use were:

> The accomplishment quotient is most readily found by dividing educational age by mental age, and indicates the extent to which a child is working up to the level of his capacity. It is desirable that the accomplishment quotient of each child should approximate 100.

The educational age referred to was computed by obtaining the arithmetical average of arithmetic age, reading age, and spelling age; these ages were expressed in months and were based upon the norms provided by the authors and publishers of whatever tests happened to be used in arriving at the educational age.

This concept of educational age contains many of the fallacies which contribute to the unsatisfactoriness of the accomplishment quotient. The educational age is supposed to indicate "the pupil's

general accomplishment in three elementary-school academic subjects expressed in months." This short statement contains a number of fallacies. First, educational age does not indicate the pupil's general accomplishment, because educational tests, from which educational age is derived, refer to particular and specific accomplishments of the pupil. Second, educational age is said to indicate accomplishment in three elementary-school academic subjects, and since a statistical constant expressed as a magnitude can refer to only one type or kind of measure at a time, this is an impossibility. Third, accomplishment in school subjects cannot conveniently be expressed in months since specific accomplishment in the curriculum is connected with the number of school grades through which the pupil has progressed as well as with the age of the pupil in months.

Since the probable error of the accomplishment quotient cannot be deductively determined, it is necessary to arrive at an empirical conclusion as to its reliability. For this purpose, an extensive study was undertaken dealing with more than six hundred pupils ranging from the third to the eighth grades. Each pupil was given one form of each of the following tests, National Intelligence Test, Woody-McCall Arithmetic Test, Thorndike-McCall Reading Test, and the Buckingham Revision of the Ayres Spelling Scale. Three days later the same pupils were given a second form of the same four tests. The forms were so rotated that each was taken first and second by an equal number of pupils, making any possible systematic error negligible. The tests were all given under thoroughly standardized conditions by expert elementary-school counselors of considerable experience.

The reliabilities calculated for the four types of tests were quite in accord with the reliabilities supplied by the authors and publishers, showing that the experiment had been kept free from any errors in administration which would jeopardize or invalidate the findings. Thus two educational ages and two mental ages were computed for each pupil, leading directly to two comparable accomplishment quotients for each pupil, and the first accomplishment quotient was correlated against the second accomplishment quotient of each pupil. It may be considered that the correlation in this case affords a fair and unrestricted measure of the reliability of the accomplishment quotient. It should be remembered that

the range of talent and ability included was from the third to the eighth grades so that the coefficient of correlation was not diminished because of reduction in range.

Since these data are particularly significant in relation to the present discussion, the scatter diagram is presented in Table I. The table shows the relation between the first accomplishment quotient and the second accomplishment quotient of 604 pupils in the third to the eighth grades of the Los Angeles city schools. In this table the product-moment coefficient of correlation was calculated as .278, while a check calculation based on the assumption of

TABLE I

RELATION BETWEEN FIRST AND SECOND ACCOMPLISHMENT QUOTIENTS

First Accomplishment Quotient	Second Accomplishment Quotient										
	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	120–129	130–139	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
130–139	....	....	....	....	....	....	1	....	....	....	1
120–129	....	....	....	....	....	4	2	1	....	....	7
110–119	....	....	....	....	6	41	23	9	....	1	80
100–109	....	....	....	5	40	112	77	11	6	....	251
90– 99	1	....	....	4	53	122	37	5	....	....	222
80– 89	....	....	....	1	14	22	3	....	....	....	40
70– 79	....	....	....	....	1	2	....	....	....	....	3
Total	1	....	....	10	114	303	143	26	6	1	604

different arbitrary origins gave a coefficient of .274. Taking .28 as the coefficient of correlation, the coefficient of alienation is found to be .96. The standard deviation of the first accomplishment quotients is 8.5 points, and the standard deviation of the second is 8.9 points. Since the standard error of estimate is equal to the product of the coefficient of alienation and the standard deviation of the estimated series, the standard error of estimating the first accomplishment quotient knowing the second is 8.15, and the standard error of estimating the second accomplishment quotient knowing the first is 8.55.

It is more than evident that the coefficient of .28 shows a reliability which is vastly lower than the reliability of any educational

measure which should be retained in use. Several smaller studies have been made during the past year which have checked in all significant points with that presented herewith; these have shown that the reliability of the accomplishment quotient, using two educational ages referred against the results from one intelligence test —that is, keeping the mental age constant—will not show a reliability of much more than .50. The foregoing table and discussion afford abundant evidence of the unreliability of the accomplishment quotient of the individual pupil, but it might be of interest to consider what results the use of the accomplishment quotient has effected in larger groups and in relation to school administration.

In the counselors' reports of the surveys returned to the schools, the distribution of accomplishment quotients for the school was given in each report together with the mean accomplishment quotient and the standard and quartile deviations of the distribution. The schools were instructed that the accomplishment quotient of each child should approximate 100, that the mean accomplishment quotient of the entire school should also approximate 100, and that the deviation should be a minimum. The schools were rated on a scale for their performance in meeting these requirements and the ratings were supposed to show the school's efficiency in attaining high educational standards.

An A.Q. of 100 purports to be the goal for both school and pupils. Since those attaining this goal are supposed to have achieved success and those who do not reach it are rated as having failed, it is apparent that the goal which has been set up should be equally attainable by all. It should be one toward which each pupil has a fair start and is without handicap in his attempt to reach.

If such is the case, if the condition of equality of opportunity is to be met, it would be necessary that the correlation between the accomplishment quotient and intelligence quotient be zero. In other words, the amount of the accomplishment quotient must be independent of the amount of the intelligence quotient. This assumption of equality of opportunity is thus one which is directly amenable to empirical investigation. If the assumption is tenable, the coefficient of correlation should be no larger a magnitude than might readily be ascribed to chance fluctuation from zero.

In order to test the validity of this assumption, a representative elementary school with an enrollment of 469 pupils, which had just been surveyed, was selected. The mean intelligence quotient of the group was 103 and the mean accomplishment quotient was 96. According to the assumption, it would be supposed that all the pupils of this school had a fair and equal chance to get an A.Q. of 100, or at least that all of them had an equal chance of getting an A.Q. of 96. A scatter diagram of the relation between intelligence quotient and accomplishment quotient of these 469 pupils is shown in Table II.

TABLE II

RELATION BETWEEN INTELLIGENCE QUOTIENT AND ACCOMPLISHMENT QUOTIENT OF PUPILS FROM THE THIRD TO THE EIGHTH GRADES IN A REPRESENTATIVE LOS ANGELES ELEMENTARY SCHOOL

Intelligence Quotient	Accomplishment Quotients								Total	Average Accomplishment Quotient
	50–59	60–69	70–79	80–89	90–99	100–109	110–119	120–129		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
140–149	....	....	3	3	4	....	....	....	10	86
130–139	....	....	1	7	7	....	....	....	15	89
120–129	....	....	5	14	20	2	....	....	41	90
110–119	....	2	6	18	40	12	2	....	80	92
100–109	....	....	5	20	57	31	5	....	118	96
90– 99	1	....	....	10	60	48	4	1	124	99
80– 89	....	....	....	5	28	22	3	....	58	99
70– 79	....	....	....	....	7	7	1	....	15	101
60– 69	....	....	....	....	....	3	....	1	5	107
50– 59	....	....	....	....	....	....	2	1	3	118
Total	1	2	20	77	224	125	17	3	469	

The coefficient of correlation in this scatter diagram is —.455, giving a coefficient of alienation of .89. The correlation ratio (Eta) is .51. It might be remarked that from a study of one hundred elementary schools, where the coefficient of correlation between intelligence quotient and accomplishment quotient was calculated, in forty cases the absolute magnitude of the coefficient of correlation was greater than the case of the school presented herewith, and in every one of the cases the coefficient was negative. This means that the situation presented in Table II is not only fairly representative of the city, but also that 40 percent of the schools would present a more unsatisfactory situation.

Ten pupils had intelligence quotients of more than 140, and the average accomplishment quotients for the ten pupils was only 86. Fifteen pupils had intelligence quotients between 130 and 140, and their average accomplishment quotient was only 89. Not one of these pupils was able to attain an accomplishment quotient as high as 96, although they represent the highest 5 percent of intelligence in the school. Fifty-eight pupils had intelligence quotients between 80 and 90, and their average accomplishment quotient was 99. Fifteen pupils had intelligence quotients from 70 to 80, and their average accomplishment quotient was 101. Five pupils had intelligence quotients from 60 to 69, and their average accomplishment quotient was 107. Three pupils had intelligence quotients below 60, and their average accomplishment quotient was 110.

Instead of each pupil having an equal chance to get a favorable accomplishment quotient, it appears that out of almost five hundred pupils in no case did an individual, having a high intelligence quotient get a favorable accomplishment quotient and that individuals having a low intelligence quotient obtained accomplishment quotients far above the average. So an A.Q. of 100 means an entirely different thing in one part of the range from what it does in another.

Turning to the situation in regard to the mean intelligence quotient and mean accomplishment quotient of the school, very much the same situation is found. It was supposed that if the schools were properly administered, the mean accomplishment quotient would approximate 100. On the basis of twenty-four schools on which counselors' reports had been made, the mean accomplishment quotient of each school was correlated against the mean intelligence quotient of the same school. For this group of twenty-four schools, there was a correlation of —.59. This meant that instead of every school having an even chance of getting a high mean accomplishment quotient, the intelligence quotient was such a significant factor in the situation that the accomplishment quotient had really become no measure at all.

It was also supposed that the deviation of accomplishment quotients in a school should be made a minimum. The standard deviation and the quartile deviation of accomplishment quotients were both included on each survey report, and the schools were again

rated on a scale as to how well they were succeeding in reducing the deviation of accomplishment quotients.

Here then are two constants, the mean A.Q. of 100 and the minimum deviation of accomplishment quotients both of which were goals toward which the schools were striving as marks of good administration. It was supposed that if the school were properly administered, the mean accomplishment quotient would go up toward 100, and the deviation of accomplishment quotients would go down toward zero. We have expressed the conditions here that might be expected to produce a high negative correlation between accomplishment quotients and the deviation of accomplishment quotients, since through the operation of good administration one would get larger and the other smaller.

In the group of twenty-four schools just described, the mean accomplishment quotient was correlated against the quartile deviation of accomplishment quotients. Instead of finding a high negative correlation, however, a very low positive correlation of .19 was found. This coefficient was so low that it was negligible, but the significant fact here was that whatever caused a school to have a high mean accomplishment quotient had no effect in making the quartile deviation smaller. This does not agree at all with the statement that good school administration would bring about both a high mean accomplishment quotient and a minimum deviation.

CONCLUSIONS

1. The correlation between first and second accomplishment quotients of six hundred elementary-school pupils, distributed from the third to the eighth grades, was found to be .28, with standard deviations of 8.5 points and 8.9 points, respectively. This reliability is lower than the minimum desirable to continue a statistical measure in use.

2. In a study of one hundred elementary schools, a negative correlation was found to exist between the accomplishment quotient and the intelligence quotient in every instance. The median coefficient was —.39. This means that pupils do not have an equal opportunity to attain high accomplishment quotients. They would have equal opportunity only in a situation where school grade was based entirely on mental age—a situation at present non-existent.

3. In a group of twenty-four elementary schools, the correlation between the mean accomplishment quotient and the mean intelligence quotient was —.59. Schools have even less equal opportunity to attain high mean accomplishment quotient than have pupils to attain high individual accomplishment quotients.

4. In the same group of twenty-four schools, there was no evidence that mean accomplishment quotient and quartile deviation of accomplishment quotients were similarly affected by administrative attempts to raise the one and reduce the other. In place of an expected high negative correlation, a coefficient of +.19 was actually found.

5. In so far as may be judged from the results of this study, the administrative use of the accomplishment quotient is open to serious criticism.

A WORK IN COMMERCIAL PROGNOSIS

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IN the past decade tests have played an important rôle in education. While much has been done in devising intelligence and achievement tests, little has been accomplished in the vocational field. Toops, Bills, Burt,[1] and others have done some work with commercial tests. Much of this study has been carried on with the idea of selecting efficient workers in certain vocations, such as stenography, typewriting, bookkeeping, comptometry, and the more distinctly clerical occupations, such as filing, checking, and tabulating. The experimentation has been done largely with high-school graduates who have gone into the industries, with students in business colleges, and with office workers in large establishments.

Students frequently enter the commercial department in high school with little or no idea of their fitness for the type of work offered. After a few weeks or a semester, they may find their aptitudes unsuited to the tasks and drop the subject. If a battery of tests could be worked out that would largely determine in advance which students would, and which students would not, be successful in these subjects, such tests would serve a useful purpose.[2] Pupils who anticipated selecting a commercial course could, after taking these tests, be classified into three groups: those who ranked as excellent could be grouped in one section; those who ranked as good, in another; and those who ranked as fair, in still another; while those who made a poor showing on the test could be advised to take up some other course.

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[1] Toops, Herbert A. *Test for Vocational Guidance of Children Thirteen to Sixteen.* New York, Teachers College, Columbia University, 1923. 156 pp. (Teachers College, Columbia University, Contribution to Education No. 136)

Bills, M. A. "Methods for Selection of Comptometer Operators and Stenographers, Carnegie Institute of Technology," *Journal of Applied Psychology*, 5: 275-83, September, 1921.

Burt, Cyril. "Tests for Clerical Occupations," *Journal of the National Institute of Industrial Psychology*, 1: 23-27, 79-81, January and April, 1922.

[2] Hull, Clark L., and Limp, Charles E. "The Differentiation of the Aptitudes of an Individual by Means of Test Batteries," *Journal of Educational Psychology*, 16: 73-88, February, 1925.

Limp, Charles E., "The Use of the Regression Equation in Determining the Aptitudes of an Individual," *Journal of Educational Psychology*, 16: 414-18, September, 1925.

The investigation described in this article was made with the purpose of selecting a battery of tests which would predict the aptitudes and abilities of high-school Freshmen to learn stenography and typewriting as taught in the high school. If such a battery of tests can be procured, a student from his score on the tests may have some assurance regarding the degree of success he will have, if he applies himself, not only in the courses in these subjects in high school but later in the business world. Much time would be saved if those who make a poor showing on the tests would devote their energies to other activities. Such tests would also serve as a means of vocational guidance; for, before vocational guidance can be reduced to a science, some way of determining a student's ability must be found.

In the search for the tests which would best detect the abilities needed in these commercial courses, any test which seemed at all likely to measure an ability needed by a stenographer or a typist was considered. Among the tests given were intelligence tests, will-temperament tests, motor tests, commercial tests; tests involving ability to follow directions, attention, perception, and speed and coordination of reaction.

The high school in which the tests were given is rather large; about three hundred students are enrolled in the commercial department each year. At the beginning of each semester 60 to 75 first-year students enroll for courses in shorthand and typewriting. Of these beginners, ten or twelve fail in these subjects. Is this fact due to lack of sufficient preparation, to improper application on the part of the student, to inefficient instruction, to environment, to the unwise selection of the course, or to the weakness of the student in the abilities which produce success in these courses? No doubt all the factors suggested by this question have a bearing upon the failure of these ten or twelve students, but it is the belief of the writer that the last item is the most important; in other words, that most of those who fail do so because their aptitudes and abilities do not fit them for commercial studies.

From the variety of tests available, forty were chosen because they seemed to bear some relation to the abilities needed in commercial courses. These tests were given at first to 118 first-year students after one week of instruction in shorthand and type-

TABLE I

THE TESTS AND THEIR ZERO-ORDER CORRELATIONS WITH THE CRITERIA

Titles of Tests and Subtests	Shorthand Criterion	Typewriting Criterion
(1)	(2)	(3)
Terman Group Test of Mental Ability:		
1. Terman test complete	+.26	+.05
2. Information	+.20	−.09
3. Best answer	+.08	−.10
40. Word meaning	−.05	−.23
4. Logical selection	+.33	+.19
5. Arithmetic	+.16	+.09
6. Sentence meaning	+.06	−.19
7. Analogies	+.32	+.14
8. Mixed sentences	+.05	+.00
9. Classification	+.11	−.12
10. Number series	+.13	+.30
Hoke Prognostic Test of Stenographic Ability:		
11. Hoke test complete	+.36	+.22
12. Motor reaction	+.05	+.05
13. Speed of writing	+.09	+.12
14. Quality of writing	+.15	+.02
15. Speed of reading	+.21	+.15
16. Memory span	+.22	+.07
17. Recognition spelling	+.53	+.49
18. Symbols	+.20	+.14
Downey Group Will-Temperament Test:		
19. Downey test complete	+.08	+.01
20. Speed of decision	+.23	+.02
23. Coordination of impulses*	+.14	+.19
24. Speed of movement freed from load	+.07	+.03
25. Motor inhibition	+.22	+.18
26. Volitional perseveration	−.09	+.05
27. Interest in detail	+.03	+.03
28. Motor impulsion	+.03	+.13
29. Self-confidence	+.10	+.15
30. Non-compliance	+.00	−.09
31. Finality of judgment	+.04	+.01
32. Woodworth and Wells Easy Direction Test	−.04	+.07
33. Whipple Cancellation Test (A's)	+.24	+.20
34. Clapp Correct English Test	+.34	+.21
35. Pressey Vocabulary Test	+.27	+.11
36. Speed of Reaction (drawing lines up and down on paper—30 seconds)	+.23	+.02
37. Coordination of Reaction (placing dots in squares—30 seconds)	−.00	+.01
Courtis Arithmetic Test:		
38. Addition	+.06	+.06
39. Multiplication	+.40	+.33

*Tests 21 and 22 were omitted intentionally. After all the test papers were scored, it was found that the papers for these tests could not be used.

writing. The instructors of these courses were asked to make a careful study of each student and to rank each at the end of the third month and again at the end of the fifth. The criterion of success in studying shorthand was obtained by combining the average of the rankings given by the shorthand teacher, the average of the grades obtained in the weekly speed tests, and the mark in shorthand for the semester. The criterion for success in typewriting was obtained by a similar combination. The correlations between each test and the criterion for shorthand and for typewriting are shown in Table I. Of the 118 students tested, 107 came through with test and criterion records complete in every detail.

TABLE II

CERTAIN STATISTICAL MEASURES OF THE SELECTED TESTS

	Mean	SD	Correlation with Shorthand Criterion	Correlation with Typewriting Criterion
(1)	(2)	(3)	(4)	(5)
Shorthand criterion	79.9	10.2	.....	.....
Typewriting criterion	79.4	7.7	.....	.....
Best answer (3)	14.3	5.2	.08	−.10
Logical selection (4)	7.7	3.2	.33	.19
Sentence meaning (6)	9.0	4.9	.06	−.19
Number series (10)	11.0	5.9	.13	.30
Memory span (16)	53.7	16.6	.22	.07
Recognition spelling (17)	41.3	15.3	.53	.49
Motor inhibition (25)	2.7	2.4	.22	.18
Speed of reaction (36)	127.8	15.1	.23	.02
Courtis' multiplication (39)	6.9	3.3	.40	.33
Word meaning (40)	8.2	7.2	−.05	−.23

SELECTING THE BATTERY OF TESTS

It is recognized that only a few of the tests given in Table I can be included in practical program. Accordingly, the selection of the tests of highest predictive value becomes the first problem. Subsequently, two regression equations will be written. One of these will give the best weighting for each selected test with reference to the criterion in shorthand, while the other will do the same with reference to the criterion in typewriting.

After the zero correlations shown in Table I had been found, the ten tests that yielded the highest positive or negative correlation with each criterion were selected. These are shown in Table II.

If it was found, however, that two of these ten tests correlated highly with each other, only the more favorable one was retained. Two considerations determined this matter. The first was high multiple correlation with the criterion, after the fourth partial; the second was the length of time required to give the test in question. The resulting battery can be given in thirty minutes, allowing time for instruction.

Table III gives the six tests that were finally selected for each subject, together with the significant correlations. In order to have a check on the multiple correlations and to prove the arithmetic from beginning to end, the correlation between the criterion scores and the predicted scores was made. This gave an r of .61 for short-

TABLE III

ZERO-ORDER CORRELATIONS AND FOURTH-ORDER PARTIAL CORRELATIONS OF THE TESTS SELECTED

Tests Correlating Highest with Shorthand	Correlation		Tests Correlating Highest with Typewriting	Correlation	
	Zero-Order	Fourth-Order Partial		Zero-Order	Fourth-Order Partial
(1)	(2)	(3)	(1)	(2)	(3)
Logical selection (4)	+.33	+.21	Best answer (3)	−.10	−.16
Sentence meaning (6)	+.06	−.06	Sentence meaning (6)	−.19	−.25
Recognition spelling (17)	+.53	+.41	Recognition spelling (17)	+.49	+.50
Courtis multiplication (39)	+.40	+.19	Courtis multiplication (39)	+.33	+.21
Word meaning (40)	−.05	−.20	Word meaning (40)	−.23	−.16

hand and an r of .63 for typewriting. This is a perfect check, proving the accuracy of all the computations involved. In addition to these two correlations, the following were worked out:

Correlations between	r
Criteria (shorthand and typewriting)	+.46
Predictions (shorthand and typewriting)	+.92
Rankings and school grades (shorthand)	+.90
Rankings and school grades (typewriting)	+.71

It is quite likely, however, that the rankings were affected by the teachers' monthly school grades despite the fact that they were made independently of such ratings. This probably accounts for the high correlation noted in the last two items just given.

Before a battery of tests can be of the greatest value for purposes of prediction, one must find the best weight to be attached to each test score. The finding of these best weights is accomplished by forming a regression equation. In the present investigation the equation for shorthand is

$$X_c = +.681X_2 - .112X_3 + .277X_4 + .562X_5 - .277X_6 + 62.63.$$

In this equation the subscript c refers to the predicted criterion and the subscripts 2, 3, 4, 5, and 6 stand for tests 4, 6, 17, 39, and 40, respectively. The regression equation for typewriting is

$$X_c = -.213X_1 - .355X_3 + .256X_4 + .444X_5 - .162X + 73.33,$$

TABLE IV

THE USE OF THE REGRESSION EQUATION IN COMPUTING THE PREDICTION GRADE

Test Number	Shorthand Score			Test Number	Typewriting Score		
	Test Score	Multiplier or Weight	Weighted Score		Test Score	Multiplier or Weight	Weighted Score
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
.....	.....	.....	.....	1.....	1	−.213	− 1.70
2.....	2	+.681	+ 1.36	.....	.....	.....	.....
3.....	4	−.112	− .45	3.....	4	−.355	− 1.42
4.....	44	+.277	+12.19	4.....	44	+.256	+11.26
5.....	8	+.562	+ 4.50	5.....	8	+.444	+ 3.55
6.....	4	−.277	− 1.11	6.....	4	−.162	− .65
Constant (K).....	.....	.....	+62.63	Constant (K).....	.....	.....	+73.33
Total predicated score.....	.....	.....	79.1	Total predicated score.....	.....	.....	84.4

where the subscript c is for the predicted criterion and the subscripts 1, 3, 4, 5, and 6 stand for tests 3, 6, 17, 39, and 40, respectively. By means of these regression equations, estimates or forecasts were made in terms of school grades for each pupil in both shorthand and typewriting.

Table IV illustrates the use of these regression equations. John Doe made the test scores in shorthand as shown in Column 2. It will be noted that in this table the numbering of the tests in Columns 1 and 5 are not the same as in Table I. They correspond to the subscripts in the regression equations. Thus test No. 1 in Table IV is the original test No. 3 and so on as just indicated in connection with the regression equations. John Doe's score of 2

on test No. 2, according to the regression equation for shorthand, must be multiplied by +.681 (Column 3). This gives a product or weighted score of +1.36 (Column 4). When the arithmetic required by the regression equation for shorthand has been completed John Doe's predicted grade for shorthand is found to be 79.1. A similar computation, using the regression equation for typewriting, results in a predicted grade of 84.4 for that subject.

The predicted grades of five students, computed as indicated in Table IV, are shown in Columns 3 and 6 of Table V. The actual scores of each of these students are shown in Columns 2 and 5. Thus the average school grade of student No. 1 in shorthand was

TABLE V

ACTUAL AND PREDICTED GRADES FOR THE FIRST FIVE OF THE ONE HUNDRED AND SEVEN STUDENTS

STUDENT	SHORTHAND			TYPEWRITING		
	Criterion	Predicted Grade	Error of Prediction	Criterion	Predicted Grade	Error of Prediction
(1)	(2)	(3)	(4)	(5)	(6)	(7)
No. 1	68.6	76.6	8.0	72.8	81.5	8.7
No. 2	79.4	78.9	.5	80.0	79.6	.4
No. 3	85.8	73.2	12.5	86.3	75.3	11.0
No. 4	80.7	79.0	1.7	65.3	79.2	13.9
No. 5	63.9	72.4	8.5	83.2	76.4	6.8

68.6. His predicted grade was 76.6. He, therefore, lacked 8 points on the ordinary marking scale of doing what was expected of him according to the tests. Student No. 2 did a half-point better than the tests predicted, and so on.

The extent of the variation in shorthand between the actual school grades of the 107 students and their predicted grades may be summarized as follows:

Extent of Variation	Number of Students
Less than 1 point	14
From 1 to 3 points	16
From 3 to 5 points	15
From 5 to 10 points	31
From 10 to 14 points	17
14 points and over	14

The corresponding summary of the facts of variation between school grades and predicated grades in typewriting is:

Extent of Variation	Number of Students
Less than 1 point	12
From 1 to 3 points	17
From 3 to 5 points	19
From 5 to 10 points	42
From 10 to 14 points	11
14 points and over	6

The mean deviation for the 107 pupils in shorthand was 8.2 points; in typewriting, 6.6 points; while the average error of prediction was 7.2 points and 5.8 points, respectively. The ratio of the average deviation to the average error of prediction is a reliability measure of the predictive value in forecasting ability to learn shorthand. It shows that the average error of prediction of marks in terms of school grades is less than the average of errors one would make by mere chance guessing at the marks. The ratio of the standard deviation instead of the ratio of the average deviation is more commonly used; however, the two ratios tend to be the same.

If the error of prediction in forecasting success of a given aptitude by means of a battery of tests is equal to the standard deviation of the criterion, the tests are of no value whatsoever. Conversely, if the standard error of forecasting a criterion by means of a battery of tests is zero, the tests are perfect. The actual efficiency of any test or battery of tests is measured by this error of estimate.

SUMMARY

While these tests have not proved altogether satisfactory, yet they are a step in the right direction and have been of very great value in forecasting the aptitudes of commercial students. It is the belief of the writer that before vocational guidance can be placed on a scientific basis, some such procedure as that described in this article will be used not only for commercial subjects but for other vocations as well. The predicted grades furnish data regarding the capacity of each student to do the proposed work. A student with a predicted grade of 70 or below is likely to make a low grade or fail in the course while a student with a predicted grade

of 90 or above will probably pass with a high grade. The predictions are based upon the supposition that the student is in good health, attends school regularly, and normally applies himself to the work. In making up the formal school grade by the teacher such factors as attitude, courtesy, conduct, and the like, should not enter, since this battery of tests does not attempt to measure them.

The experiment has been repeated each year since the original experiment in 1922, and the tests have now been given to several hundred students. Each repetition of the experiment has not only substantiated the results and verified the reliability of the original experiment, but has made an even better showing. The average error of prediction in terms of school marks has been reduced from 7.2 points to 6.3 points for shorthand and from 5.8 points to 5.2 points for typewriting. Thus from these findings it seems that ability to learn shorthand and typewriting can be predicted with a fair degree of accuracy.

EDITORIALS

THE PLACEMENT OF TEACHERS A STATE FUNCTION

Public education is the state's business. This fact is never seriously questioned: the laws affirm it and the courts uphold it. The extent to which the state may control school matters is almost unlimited. It may require the attendance of pupils, fix the length of the school year, make the course of study, and adopt textbooks. It may regulate finances and control the erection of buildings. It may define the eligibility of teachers, certify them for service, establish their minimum salary, and dictate the conditions of their retirement. The authority of the state in connection with the public schools is unquestioned.

It will be generally admitted that the great school problem is the problem of personnel. The supreme question is, Who teaches? Put into every classroom a teacher of "first-rate intellect, morals, and skill" and all other difficulties are made easy.

Since this is true it might be supposed that the state would be profoundly concerned with the placement of teachers. After having made laws concerning their eligibility and certification and after having spent millions in training them, the state might be expected to see that each person appointed to a particular teaching position possessed the requisite eligibility, the proper certification, and the appropriate training. This, however, is not the case. In one state a count of the new teachers actually appointed revealed the fact that a large number of them had never been properly certified. The placement of these teachers was contrary to law. If an abuse of this kind is carried far enough it will render inoperative all the laws intended to safeguard the schools from incompetent teachers.

Again it has been found that even when teachers are legally qualified they may be relatively unfitted for the positions they take. One investigation showed that in a certain year there were thirty-one graduates of state institutions who were trained for a special

type of service. The following year seventy-five teachers were appointed in the same state to this type of service—that is, to the very positions which the thirty-one graduates had been trained to fill. It might be supposed therefore that practically all of the thirty-one would have received appointments in accordance with their training since there were considerably more than twice as many positions as they could fill. Nothing of this sort happened. In reality it was found that only one of the seventy-five available positions was filled from the ranks of the thirty-one trained for this service. In other words, the public schools were recruited in this respect with almost total disregard of the available candidates trained at state expense.

Thousands of persons trained for teaching service fail to become teachers in any capacity. In one state more than one-eighth and in another state nearly one-fifth of the trained graduates were entirely lost to the schools of the state in question. Many of these graduates failed to become teachers because they could not obtain positions—this in spite of the fact that in both the states to which we refer there was a pronounced shortage of trained teachers. In these same states data gathered concerning college graduates trained for teaching service showed that large numbers of those who did become teachers took up service other than that for which they were trained. Students who were prepared to teach history became teachers of general science. Those who were trained for one-room rural schools became teachers of city graded schools. In Ohio, for example, the county normal schools, organized especially for training teachers for rural schools, placed only 59 percent of their graduates of 1923 in schools of this kind. Many of the rest became teachers of village and city graded schools. One or two became kindergartners; several became high-school teachers; and nine became superintendents!

The lack of agreement between training received and positions taken may be further illustrated by referring to data concerning the graduates of kindergarten training schools in the state of Ohio. In 1923 reports were received from 165 such graduates of whom 120 became teachers of some kind, 91 of them in Ohio. Of the 91 there were 80 who taught in the public schools, the remaining eleven having entered private schools. As to the 80, only 36 entered kindergarten service.

As has already been intimated, a selected personnel is undoubtedly the most important efficiency principle which can be invoked for the benefit of the public schools. Too many teachers are being employed without legal qualifications. Altogether too many trained teachers are filling positions for which they are not adapted. It is a strange commentary upon the efficiency of a state organization that it should provide laws and teacher-training institutions and then be indifferent to the workings of these laws and the utilization of the product of the institutions.

The state should enter the field in the matter of placing teachers. A permanent bureau of the State Department should be created to study the needs of the schools and the supply of teachers. This bureau should coordinate the appointment service of the various teacher-training institutions to the end that vacancies may be filled by those whose qualifications correspond to the positions in question. Every State Department has some oversight over teacher-training institutions. In cooperation with these institutions it should develop an effective method for placing graduates and for following them up. It should vest authority somewhere for the continuous study of the problems of placing and holding a sufficient corps of well-trained teachers, at the same time giving to this authority the power to put into effect the results of its findings.

B. R. B.

NEWS and COMMUNICATIONS

Mental Hygiene: Its Place in the Classroom is the title of a pamphlet (Bulletin No. 875) issued by the University of the State of New York. It is written by Dr. Ethel L. Cornell, psychologist in the Educational Measurements Bureau.

The English Department of the high school, at Washington, Pennsylvania, has edited a page of the local city newspaper, the *Reporter*, each week during the present year. This is an example of the fine cooperation between the schools and the press of the city.

An exceedingly sane discussion of the need of double classification in adjusting pupils to the various grades has been written by our publisher, George A. Brown. If you have not seen it, send for it. You will find some suggestions therein which may be of interest to you regardless of the amount of thought you have already given to this subject.

The *Revue Pedagogique* (Paris) changed its title to *L'Enseignement Public* with the first number of the year. It is the purpose of the editors to make this journal a medium for disseminating any information or materials that have a bearing on public education. As in this country, so in France, there are numerous journals dealing with limited fields of education, primary, secondary, or with particular subjects, such as history and mathematics. Under the new title *L'Enseignement Public* hopes to deal with problems common to the various fields of education and to become a clearing-house for the discussion of mutual problems.

Coincident with the first issue of *L'Enseignement Public*, successor to the *Revue Pedagogique*, comes an announcement of the death of Mr. Paul Lapie who has directed the magazine since early in 1914. Mr. Lapie was instrumental in having the name of the journal changed to *L'Enseignement Public*, for he felt the need of a magazine that could discuss the problems common to all the fields of public education.

The Bureau of Educational Reference and Research, of the University of Michigan, reports, in a recent mimeographed bulletin (No. 103), the results of the Wilson Language Error Test given last October. The results show lower achievement than those obtained in the previous May and June, but greater than the standards estimated by the author for October. The achievement in 1926 is much greater than that shown in the survey of the previous year.

Our attention has been called to an error in the September issue of this Journal in stating that Mr. Harold H. Bixler was Director of Guidance and Research in Atlantic City. Mr. Bixler has held this position in Atlanta, Georgia, for several years. He is on leave of absence this year in Teachers College, Columbia University, where he is assistant to Dr. W. A. McCall.

The State Department of Education of Mississippi has compiled a circular (No. 6, Educational Finance Series) showing school costs in towns having a population of less than a thousand. The number of teachers, the average salary per month, the per capita cost on basis of enrollment and average attendance, and the length of school term are given for white schools only.

The Ohio Public Health Association has got out a little card which gives the height-weight table for both boys and girls and provides space for the name and address of a child and six measurements during the school year. On the card are printed certain health rules and to it is attached a 60-inch tape measure. Cards can be secured by schools in quantities for ten cents or less.

The National Committee for the Prevention of Blindness is attempting to enlist twelve thousand public-health nurses in the United States in the campaign for the eradication of the preventable causes of blindness. Mrs. Jessie Ross Royer, head of the nursing division of this committee, has recently given demonstrations before nurses' organizations in several mid-western states.

The National Honor Society, which has been in operation now for six years, has 450 chapters and more than 17,000 members among the high schools of the nation. This organization is consciously emphasizing character, scholarship, leadership, and service. Membership is open to not more than fifteen percent of the members of the graduating class. They must be selected from the upper one-third of their group.

The Service Bureau for Classical Teachers, at Teachers College, Columbia University, has put in mimeographed or printed form ideas and suggestions contributed by prominent and successful teachers throughout the country. These items, of which there are now about 260, are circulated as loans or sold at a nominal price. Persons who are interested should address Frances E. Sabin, Director of the Bureau.

Report of a School-Building Survey of Danville, Kentucky is the title of a bulletin issued by the Board of Education of that city. The survey was made under the direction of Professor Floyd W. Reeves, of the University of Kentucky; Dale Russell, director of Statistics in the State Department of Public Instruction; and Maurice F. Seay, Principal of the Danville High School. The report should be of value to the local community though it contains little that has not been done in many other survey reports.

In February, the Elementary Council, of Raleigh, North Carolina, issued a report of the committee on a suggestive list of activities in the grades. The

report is put out in the form of a mimeographed bulletin, and it contains standards for judging an activity. Activities for each of the elementary grades are listed, and bibliographical references to the sources of material are given. This is a part of a larger project, the development of a new course of study, which is being carried on by the schools of that city.

A new Social Intelligence Test designed for use in placement, occupational surveys, testing for clinical purposes, and vocational guidance is now available through the Center for Psychological Service, Washington, D. C. This test belongs to the George Washington University Series. It requires about forty-five minutes to administer and has been standardized on approximately seven thousand cases including high-school, college, and industrial groups.

Superintendent Paul Dillingham, of Falmouth, Massachusetts, recently sent us a list of the twenty-one accomplishments of his school system during the past year. Among those given are group instruction in instrumental music for high-school pupils; a school exhibit in the gymnasium which includes the work of all the school; the laboratory plan of instruction in the large high school, the reorganization of the social-science courses in the junior high school, the organization of a chapter of the Sportsmanship Brotherhood in the high school, and the introduction in the primary grades of the so-called "three-track system."

Teachers College, Columbia University, will offer during the summer session of 1927, the first course ever planned in Problems and Technique of Placement. It is intended for directors of appointment bureaus; deans, advisors of women and girls, alumni officers, registrars, and executives in colleges, professional schools, public-school systems, and philanthropic organizations such as the Y.M. and Y.W.C.A.; and commercial bureaus. This should be of special interest to teacher-training institutions which are recognizing more and more their own obligations toward the placement of their product.

The Ohio College Association, at its meeting in April, recommended to the State Department of Education that the intelligence-test standard for entrance to teacher-training courses be raised from a 6th-percentile to a 10th-percentile score. The Association also recommended that, in case the higher score be made the standard for entrance, any student failing to pass on the first examination be permitted to take a second form of the test if he so wished. The passing standard, however, for the second test should be the 15th-percentile rather than the 10th-percentile point.

Under the title, *The Public School Program*, a series of the reprints of articles has been published describing the program of instruction pursued in the public schools of Rochester, New York. These articles were published in the *Democrat and Chronicle* during a period from March 15 to July 1, 1926. Twenty-four articles deal with the various phases of elementary school, thirty-seven with the junior high school, and twenty-two with the senior high school.

It is evident from these that the public schools furnish material which is acceptable to the newspapers if only some thought is given to its preparation.

Dr. T. C. Holy, director of the Division of School Buildings and Fixed Equipment, St. Louis, has been appointed Assistant Professor of Education at Ohio State University and Research Associate in the Bureau of Educational Research. Dr. Holy received his Master's and Doctor's degrees at the State University of Iowa and was called to St. Louis in 1924 to develop a building program for the schools of that city. After completing the survey and laying out the program he was given the position which he now leaves. Dr. Holy will take up his work at Ohio State University with the opening of the Summer Quarter.

In conjunction with the Jean Jacques Rousseau Institute, of Geneva, the International Institute of Teachers College is issuing this spring a bulletin guide for educational visitors to Europe. The guide covers two major fields: it lists the more important experimental schools in the various European countries, giving the location, principal, and the outstanding purposes of each institution. It also gives for each of the European countries the outstanding educational authorities with specific indication of those to whom application should be made for permission to visit the schools in the governmental systems. The pamphlet may be secured at cost from the International Institute, Teachers College, Columbia University.

The Bureau of Educational Measurements, of the University of North Dakota, conducted in October a state-wide survey of silent reading involving more than thirteen thousand pupils in eighty-six school systems in that state. The Monroe Standardized Silent Reading Test, Revised, was used in the survey. Dr. Harold L. Camp, director of the Bureau, has recently sent to all contributing superintendents a report which shows the number of pupils involved with the median, and the 25th- and the 75th-percentile score in both rate and comprehension. The results indicate that the standards for North Dakota may be considered a little low as compared with those of the country as a whole. Dr. Camp expects to conduct a second survey in this field with the same pupils this spring.

The fifth number of the *University Review*, a summary of the current literature in higher education, issued by the Division of Educational Reference, Purdue University, contains an editorial on "The Experimental Urge" from which we quote the following:

> Now that higher education has developed the experimental urge, we may expect shortly to have a deluge of reports purporting to prove the efficacy of this, that, and the other scheme for educating the high-school graduate. These reports will be filled with statistics. Some will prove nothing, some will prove the opposite to that intended, and some will be recognized to have genuine value. This spirit of experimentation should be encouraged. It should not, however, be permitted to cloud the main issue, namely, the improved instruction of young men and women. What higher education needs today more than anything else is excellent teaching.

The Research Department of the Colorado State Teachers College, at the request of the Colorado Research Foundation, has rendered a valuable service to the state through its study of the provisions that Colorado is making for secondary education. The preliminary report, issued in May, 1926, reviewed the vocational and educational plans of 4,056 eighth-grade children in eleven representative counties of the state. This second report is concerned with (1) the extent to which the school districts of the state have established high schools, (2) the extent to which districts not having their own high schools pay tuition in other districts, (3) the ability of these districts to make such provision, (4) past and present legislation regarding tuition in Colorado, (5) present legislation in other states with respect to payment of tuition, and (6) suggested remedial legislation for Colorado so that high-school privileges might be afforded properly qualified pupils in all districts.[1]

That deprivation of such privileges exists in a large degree is evident from the mass of data presented. For example, the report states that approximately one hundred and twenty thousand, or 55 percent, of the pupils of the state, representing 50 percent of the state's area, are without high-school privileges. Furthermore, it is found that approximately twenty thousand, or 17 percent, of the pupils of the state are without district aid for needed high-school tuition. In 54 out of 63 counties, 80 percent of the districts are without high schools, and 15 percent of these districts make no provision for outside tuition. The refusal to pay outside tuition is confined to third-class districts, although more than a fourth of the second-class districts are without their own high schools. These conditions are partially due to "permissive" legislation, for two previous laws which made payment of tuition mandatory have been held unconstitutional by the State Supreme Court. A proposed mandatory high-school tuition law is included in the last part of this report, but, it is pointed out, before any such law can be made mandatory, an amendment to the present state constitution will be necessary.

The Seventh Annual Ohio State Educational Conference was held at Ohio State University, Columbus, Ohio, April 7, 8, and 9. The program consisted this year of three general sessions and thirty-seven sectional meetings. The speakers before the Conference included twenty-nine men and women from outside the state of Ohio, each of whom has an established reputation in his particular field. Furthermore, every portion of the state was called upon to contribute, and addresses were given by sixty-seven representative Ohio school people.

In addition to these programs, luncheons were held by the Deans of Women, the Geography Section, the History Section, the High-School Principals, the Journalism Section, the Junior High-School Principals, and the Physical

[1] Colorado State Teachers College. "The Legal Basis of Free Secondary Education in Colorado." Second Report of Progress in the State High-School Survey for the Colorado Research Foundation. Greeley, Colorado, Colorado State Teachers College, 1926. 65 pp. (Mimeographed report)

Education Section. The City Superintendents, Home Economics Section, Physical Education Section, Phi Delta Kappa, and Pi Lambda Theta gave dinners on Friday evening. The Phi Delta Kappa dinner had an attendance of more than two hundred men representing about twenty different chapters throughout the United States.

The Conference is attracting visitors in increasing numbers from surrounding states. Each of the states bordering upon Ohio had a number of school people present, while New York, Maryland, and Nebraska also had representatives who were not on the program.

The keynote of the Conference this year was "Expertness in Teaching" and in general the sectional programs, as well as the general sessions, centered around this theme. Educational theory and actual practice were combined in the material presented to the visiting delegates who represented every phase of the educational field from the elementary teacher in county systems to college students and university faculties. Complete registration was not secured, but a conservative estimate places the number of persons attending one or more programs at well above five thousand.

PSYCHOLOGICAL ABSTRACTS

The American Psychological Association began the publication of its new journal, *Psychological Abstracts,* with the January, 1927, number. The publication is edited by Prof. Walter S. Hunter, of Clark University, assisted by the following cooperating editors from foreign countries: F. C. Bartlett, Cambridge University, V. M. Bekhterev, Leningrad, Ed. Claparède, University of Geneva, G. C. Ferrari, University of Bologna, A. Michotte, University of Louvain, H. Pieron, Sorbonne, M. L. Reymert, formerly of the University of Oslo, and W. Wirth, University of Leipzig.

The journal consists of noncritical abstracts of articles and books on psychological and cognate subjects, which appear as soon as possible after the original publication. These abstracts, prepared by competent psychologists in America and Europe, are published in English.

The scope of the journal is indicated by the accompanying classification of its material: General Topics in Psychology, Sensation and Perception, Feeling and Emotion, Attention, Memory and Thought, Nervous System, Motor Phenomena and Action, Plant and Animal Behavior, Evolution and Heredity, Special Mental Conditions, Nervous and Mental Disorders, Social Functions of the Individual, Industrial and Personnel Problems, Childhood and Adolescence, Educational Psychology, Biometry and Statistics, and Mental Tests.

It is the intention of the Association to make *Psychological Abstracts* invaluable, not only to psychologists throughout the world, but also to all persons who are working in allied fields, such as physiology, psychiatry, education, and biology.

Sample copies of the January and February issues will be sent, for examination, on request, to H. S. Langfeld, Business Editor, Princeton University.

REVIEWS

JUDD, CHARLES HUBBARD. *Psychological Analysis of the Fundamentals of Arithmetic.* Chicago, University of Chicago, 1927. x + 121 pp. (Supplementary Educational Monographs, No. 32)

Of late years, the attention of many scientific students who are interested in the problems of teaching and learning has been drawn to arithmetic. When it became known, a few years ago, that a group of people at the University of Chicago would devote a portion of their time and laboratory facilities to research in arithmetic, a distinctive contribution to the scientific literature on this subject was anticipated. Those who have looked to Chicago for aid have not been disappointed. First came the monograph by Buswell and Judd entitled, *Summary of Educational Investigations Relating to Arithmetic*, which summarized preceding investigations in this field. *Diagnostic Studies in Arithmetic*, by Buswell and John, followed. The monograph under review is the third of the series.

The major portion of Professor Judd's monograph is concerned with an account of experiments in counting and with an analysis of results. Apparatus was designed to produce sounds and flashes of light at various rates and as frequently as the experimenter might desire. A record was kept of the errors made by subjects, both adults and children, in counting these auditory and visual stimuli. Marked individual differences were discovered. Counting more than ten sounds or flashes at the rate of three or more per second was more difficult than counting fewer than ten, due, apparently, to the tendency toward articulation of number names and the greater difficulty of articulating rapidly the number names beyond ten. In general, the subjects were more successful with the sounds than with the flashes of light. It is concluded that the difficulty which children experience in mastering the complexities of our number system and of later operations with numbers is not sufficiently appreciated by teachers.

The extent to which the reader agrees with the author's criticisms of present-day tendencies in the construction of courses of study and in methods of teaching will depend in no small measure upon the reader's own psychology. He says:

> It is sometimes urged that arithmetic be cut down to the point where only its practical applications will be included in the curriculum. The conclusions to which the study reported in this monograph lead are diametrically opposed to the doctrine that arithmetic should be reduced to a few exercises in practical calculation. If the experiments which have been reported prove anything, they prove that the general ideas which are developed through contact with numbers can be cultivated in the individual only through a broad acquaintance

with the properties of a highly perfected number system. . . . . Curriculum-makers should be urged to recognize the fact that *the curriculum is made for the purpose of training minds*, not for the purpose of reflecting immediate needs of practical living. [Italics supplied by reviewer.] . . . . A very false and misleading psychological doctrine has been current in some quarters. It is said that, in the pupil's mind, addition is nothing but a long list of particular combinations. Such psychology does not provide any explanation of the general or abstract idea of addition as distinguished from particular experiences.

These criticisms are far reaching; they are of no small import. They will be accepted by those whose psychology is that of the author; others will reject them. This psychological issue is surely an open question. Let us study and experiment; but wait and see.

R. L. MORTON

Ohio University

STROH, MARY M. *Literature for Grades VII, VIII, and IX.* New York, Teachers College, Columbia University, 1926. vii + 110 pp. (Teachers College, Columbia University, Contributions to Education, No. 232)

Into this monograph has been crowded the results of much careful investigation regarding proper reading materials for pupils in the seventh, eighth, and ninth grades. The writer has collected a large mass of evidence regarding the selections now used in those grades and finds they are confined to a decidedly narrow range of conventional materials. She adduces many good reasons for enlarging the range of reading matter and offers many helpful suggestions as to how this may be done. Doubtless many teachers are quite content to keep to this small body of conventional materials. Such an attitude is due, at times, to sheer laziness and inertia, at other times, to a hidebound conservatism, and not infrequently, to the difficulties of providing pupils with suitable materials. To such teachers the book should come as a challenge and an aid.

One phase of the large question here involved has, however, not been carefully considered in this monograph, namely, literature in its strict sense as the embodiment of something fine and permanent that is our priceless heritage and an imperative need in the cultivation of the race. Lord Bacon hit the nail on the head when he said that some books are to be tasted, some to be chewed, and others to be digested. It is quite fitting that the child should be allowed to read and discuss with his mates an article on "How Lead Pencils Are Made"; but it is even more important that he should come to know "She dwelt among the untrodden ways." Certainly there is as much of permanent value to the child in the twelve lines of the poem as in the twelve pages of an article on pencil making. Each may be quite proper mental food for the child, but let us not designate the article as *literature*.

Of course, all good writers are not like the proverbial good Indians—dead ones. Naturally and quite rightly we wish the child to be interested in what is being written in the world of today, and doubtless the schools are not doing all they should to familiarize pupils with such materials. Let us remember,

however, that a bit of verse, for example, is good literature when it stands the test of time; when from generation to generation it bears its lasting appeal. Modern materials can be found which are well worth while, but they are often like corn flakes—one must eat a peck to get a square meal.

These objections aside, however, the study is indeed a valuable one and worthy of the careful attention of all who are trying to solve the difficult problem of suitable reading materials for pupils of the junior high-school age.

H. G. PAUL

The University of Illinois

BUTTERWORTH, JULIAN E. *Principles of Rural School Administration.* New York, Macmillan Company, 1926. xvi + 379 pp.

Dr. Butterworth's book is the third in a "Rural Education Series" published by the Macmillan Company under the editorial direction of Mabel Carney. The same excellence maintained by the earlier issues of the series, *Rural Education* by Orville G. Brim and *Rural School Management* by Ina G. Barnes, is again in evidence in this book.

The mechanical features show penetrating analysis on the part of the author and adequate care by the editor and publisher. The four major divisions of the book are entitled "The Major Problems in American Rural Education," "The Organization and the Administration of the Local School Unit," "The Organization and Administration of the Higher Units," and "Financing Rural Education." The problems enumerated for further study and the specific references within and following the chapters, together with a general bibliography on the subject, are practical aids which will be appreciated alike by students and teachers.

The author of this book has brought to his task matured scholarship in education, a philosophy sane and well poised, an understanding appreciation of both the rural and urban conditions, a sense of the certainty of expansion in local institutional units in rural life, and the purpose of giving due consideration to the human factors in rural educational service contributed by the layman and the professional worker.

The reader is increasingly impressed with the compactness of the subject-matter in this book. Could Part IV, "The Financial Needs of the Rural Schools," serve the purposes of more readers by the use of definite, localized, and itemized cases as illustrations? Possibly an additional appendix for this purpose would be worth considering when the first revision is made.

The greatest service of this book will be in clarifying for its readers what is meant by the term rural education, for it is the name of a significant and an interlocking part of public educational effort. It is sometimes legitimately segregated, as in this book, and intensively studied for the purpose of reincorporating it in the state's total educational plan and apportioning it a just share of the state's annual budget.

ERNEST BURNHAM

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COLLINGS, ELLSWORTH. *School Supervision in Theory and Practice.* New York, Thomas Y. Crowell Company, 1926. xvi + 368 pp.

This book is not, as I had expected, just another book on supervision and the supervisor, but is a real contribution. In fact, I know of no other treatment of school supervision at all similar to it. The first ten chapters are spent in interpreting education as continuous growth. The exposition is clear and for the most part simple; the illustrative material is attractive. In the ninth chapter supervision is defined as guidance, which is in sharp contrast with the conventional definition of supervision. The author is much opposed to supervision of the inquisitorial and inspectorial types.

The second part of the book, chapters XI to XXII, inclusive, deals with the supervisor's instruments in measuring teaching difficulties, in constructing teaching procedures, in guiding instruction procedures, and in measuring the improvement of teachers. These are called the standards of supervision and are defined as activity, goal, drive, success, and "leading on." Chapter XI describes the use of a conduct score for the measurement of teaching, and five standards in carrying forward a particular enterprise are described and illustrated in detail. The subsequent chapters further elaborate these five standards. Chapter XXVII, in which is described a scheme for measuring improvements of teaching, is decidedly original; and chapter XIX, with its discussion of supervisor's procedure in preparing for conferences with teachers, is likewise illuminating. This is one of the few books which attempts to translate modern theories of education into supervision.

Perhaps the least valuable part of the book is the scale for measuring classroom management described in chapter XXI. I note also an absence of consideration of the problems of personnel, at least under any such heading. However, the author in discussing creative supervision has assumed unconsciously the fundamental criteria which operate in the right kind of personnel supervision. He has given due attention to capacities, interests, and opportunities and their relationship to each other. The book is original, challenging in many of its statements, and deserves to be widely read and studied.

E. E. LEWIS

Ohio State University

DOERMANN, HENRY J. *The Orientation of College Freshmen.* Baltimore, Maryland, Williams and Wilkins Company, 1926. 162 pp. (Human Relations Series, VI)

Freshmen entering college are in rather a bad way and likely to go upon the intellectual rocks if not properly oriented, if we may take Dean Doermann seriously. He paints a gloomy picture in his "statement of the problem" in the first three chapters of his book—so gloomy indeed that it almost makes one feel that the Freshman ought to be kept at home.

He gives considerable time and detail to illustrating what is now being done in representative colleges in guiding the inexperienced high-school graduate along the rocky path of college life. He outlines numerous mechanical plans

which will be helpfully suggestive to those who are considering orientation problems. He asks many pertinent questions which in most cases he leaves the individual to answer for himself. One does not often feel in his suggestions the touch of personal human relationship but rather the mechanistic method of getting at things.

The third part of the book is devoted to a detailed guidance program for colleges, the carrying out of which would involve the services of a Dean of Personnel who will bring the college into contact with the Freshman and the Freshman into contact with the college and its problems.

The book will prove helpful to those who are attempting to work out the mechanical details of orientation. If it could suggest how to make the Freshman want direction and advice, it would be even more helpful.

THOMAS ARKLE CLARK

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ANDERSON, LEWIS FLINT. *History of Manual and Industrial School Education.* New York, D. Appleton and Company, 1926. xi + 251 pp.

The present book falls into divisions, of which the first deals with European theory and practice from the sixteenth century to the latter part of the nineteenth. It was in Europe that the theory and the foundations of practice in manual and industrial school education were laid. Some early American developments are also noted in this section. Part II deals with industrial education in the United States. The book follows the practice of recent historians in emphasizing and giving larger space to recent, than to earlier, developments.

We are first introduced to the utopian visions of More and Rabelais; to the theoretical constructs of the realists and rationalists, Comenius and Liebnitz; and to the practical work of Francke, the great pioneer in the school teaching of handwork, and his followers. Rousseau, Basedow, and Salzmann exemplify naturalism, democracy, and emerging industrialism. The Pestalozzi-Fellenberg movement for the education of the poor in industry is contrasted with the cultural tendencies of Heusinger, Froebel, and their followers, a contrast that shows how ideas are modified by time and events. Two chapters are devoted to the industrial revolution. It led, on the one hand, to the philanthropic teaching of industry and applied science and, on the other, to the growth of national interest in industrial education as a means of meeting international competition in world markets.

With slight exceptions, manual and industrial education in the United States has developed since the Civil War. It is marked especially by the founding of the agricultural and mechanical colleges and by the introduction of manual training. There is a chapter on experimentation in hand training. It is devoted to the Russian system, to sloyd, and to the art movement in industrial education. Vocational developments including the epoch-making report (1906) of the Massachusetts Commission, the activities of the National Association of Manufacturers, the work of Hampton Institute, Tuskegee, Haskell, and the trade schools are treated. Educational theory of manual and industrial

education centers, in the United States, in the writings of Dewey. The Smith-Hughes Act (1917) is discussed. The final chapter summarizes the whole treatment. The book is well-documented and there are good chapter bibliographies. An index is supplied.

Here is a book that will have a necessary place in manual, industrial, and vocational courses in schools, colleges, and universities. It will serve its purpose well, for it is clear, well-organized, compact, and teachable, a rare combination of the scholarly and the practical.

We are constantly told that one side of education, the literary, has for two thousand years been overstressed. An industrial and mechanical age should add to education many new elements, without neglecting the Greek achievements let us hope; and the history of education should treat competently and critically these additions including the manual and industrial. This the author of the present book is helping to do; and thus the book will tend to establish a better balance and a more modern point of view than those which have prevailed so long.

H. G. Good

Ohio State University

PUBLICATIONS RECEIVED, MARCH 15 to APRIL 15

BOOKS FOR EDUCATIONAL EXECUTIVES

Arent, Emma. *The relation of the state to private education in Norway.* New York, Teachers College, Columbia Univ., 1926. 94 pp. (Contributions to education, no. 235) Cloth, $1.50. Paper, $1.25.

Bruner, E. D. *A laboratory study in democracy.* Garden City, N. Y., Doubleday, Page, 1927. 262 pp. $2.50.

Edmonson, J. B. *The legal and constitutional basis of a state school system.* Bloomington, Ill., Public School Pub. Co., 1926. 203 pp. $1.50.

Ford, W. S. *Some administrative problems of the high school cafeteria.* New York, Teachers College, Columbia Univ., 1926. 147 pp. (Contributions to education, no. 238) Cloth, $1.50. Paper, $1.25.

Good, Alvin. *Sociology and education.* New York, Harper, 1926. 589 pp. $3.00.

Loomis, A. K. *School equipment costs; a method of estimating.* New York, Teachers College, Columbia Univ., 1926. 259 pp. $2.00.

Quance, F. M. *Part-time types of elementary schools in New York City; a comparative study of pupil achievement.* New York, Teachers College, Columbia Univ., 1926. 49 pp. (Contributions to education, no. 249) Cloth, $1.50. Paper, $1.25.

Sheehan, M. A. *Extra-curricular activities in a junior high school.* Boston, Badger, 1927. 181 pp. $1.75.

Simpson, A. D. *Financing education in Connecticut.* Hartford, Conn., State of Connecticut, 1927. 198 pp.

Smith, J. M. *The training of high school teachers in Louisiana.* New York, Teachers College, Columbia Univ., 1926. 101 pp. (Contributions to education, no. 247) Cloth, $1.50. Paper, $1.25.

Wood, T. D., and Rowell, H. G. *Health supervision and medical inspection of schools.* Philadelphia, Saunders, 1927. 637 pp. $7.50.

BOOKS FOR PSYCHOLOGISTS

Baker, H. J. *Characteristic differences in bright and dull pupils.* Bloomington, Ill., Public School Pub. Co., 1927. 118 pp. $1.50.

Collins, Mary, and Drever, James. *A first laboratory guide in psychology.* New York, Dutton, 1926. 108 pp. $1.60.

Miller, E. *Types of mind and body.* New York, W. W. Norton & Co., 1927. 95 pp. $1.00.

Reed, H. B. *Psychology of elementary school subjects.* Boston, Ginn, 1927. 481 pp. $2.00.

Templin, Olin, and McCracken, Anna. *A guide to thinking; a beginner's book in logic.* Garden City, N. Y., Doubleday, Page, 1927. 252 pp. $1.50.

Warden, C. J. *A short outline of comparative psychology.* New York, W. W. Norton & Co., 1927. 96 pp. $1.00.

Wells, F. L. *Mental tests in clinical practice.* Yonkers-on-Hudson, N. Y., World Bk. Co., 1927. 315 pp. $2.16.

Woodburne, A. S. *Human nature and education.* New York, Oxford Univ. Press, 1926. 292 pp. $4.25.

BOOKS FOR TEACHERS AND SUPERVISORS

Blackstone, E. G. *Research studies in commercial education.* Iowa City, Ia., Univ., of Iowa, 1926. 160 pp. (University of Iowa monographs in education. First series, no. 7) $.50.

Bowen, W. P. *The conduct of physical activities in elementary and high schools.* New York, Barnes, 1927. 173 pp. $2.00.

Brace, D. K. *Measuring motor ability; a scale of motor ability tests.* New York, Barnes, 1927. 138 pp. $2.00.

Burnham, A. C., and Bonser, F. G. *Life planning and the technique of achievement; the principles and a syllabus for teachers and students.* Ann Arbor, Mich., Edwards Bros., 1927. 259 pp. $2.50.

Carroll, R. P. *An experimental study of comprehension in reading with special reference to the reading of directions.* New York, Teachers College, Columbia Univ., 1926. 72 pp. (Contributions to education, no. 245) Cloth, $1.50. Paper, $1.25.

Collings, Ellsworth. *School supervision in theory and practice.* New York, Crowell, 1927. 368 pp. $2.75.

Dunn, F. W., and Everett, M. A. *Four years in a country school.* New York, Teachers College, Columbia Univ., 1926. 173 pp. $1.75.

Flinn, Emma, and others. *Kindergarten-primary school life.* Valley City, N. D., State Teachers College, 1926. 71 pp. $.75.

Folsom, I. M. *Lessons from the out-of-doors.* Boston, Stratford Co., 1927. 213 pp. $2.00.

Gleason, N. K. *Spelling games.* Chicago, Beckley-Cardy, 1927. 89 pp. $.80.

Horn, Ernest. *A basic writing vocabulary; 10,000 words most commonly used in writing.* Iowa City, Ia., Univ. of Iowa, 1926. 225 pp. (University of Iowa monographs in education. First series, no. 4) $1.75.

Kittson, E. C. *Theory and practice of language teaching with special reference to French and German.* New York, Oxford Univ. Press, 1926. 186 pp. $1.70.

McMurry, F. M., and Benson, C. B. *Teachers' manual to social arithmetic, book one.* New York, Macmillan, 1927. 46 pp. $.40.

Roberts, L. J. *Nutrition work with children.* Chicago, Univ. of Chicago Press, 1927. 394 pp. $3.60.

Ruch, G. M., and Stoddard, G. D. *Tests and measurements in high school instruction.* Yonkers-on-Hudson, N. Y., World Bk. Co., 1927. 381 pp. $2.20.

Snedden, David. *What's wrong with American education?* Philadelphia, Lippincott, 1927. 379 pp. $2.00.

Snedden, David, and others. *Reconstruction of industrial arts courses.* New York, Teachers College, Columbia Univ., 1927. 143 pp. $1.50.

Stott, Leila. *Adventuring with twelve year olds.* New York, Greenberg, 1927. 193 pp. $2.00.

Tracy, H. C. *Towards the open; a preface to scientific humanism.* New York, Dutton, 1927. 257 pp. $3.50.

Troxell, Eleanor. *Language and literature in the kindergarten and primary grades.* New York, Scribner, 1927. 264 pp. $1.25.

Webster, E. H., and Smith, D. V. *Teaching English in the junior high school.* Yonkers-on-Hudson, N. Y., World Bk. Co., 1927. 404 pp. $2.00.

West, P. V. *Changing practice in handwriting instruction.* Bloomington, Ill., Public School Pub., Co., 1927. 142 pp. $1.25.

BOOKS FOR HIGH-SCHOOL STUDENTS

Alarcón, D. P. A. de. *El sombrero de tres picos.* Richmond, Va., Johnson Pub. Co., 1927. 256 pp. $1.32.

Bailey, D. C. *A new approach to American history; students' guide sheets.* Chicago, Univ. of Chicago Press, 1927. 82 pp. $1.50.

Belding, A. G., and Greene, R. T. *Rational bookkeeping and accounting.* New York, Gregg, 1927. 383 pp. $2.00.

Bernard, D. M. *Plane geometry.* Richmond, Va., Johnson Pub. Co., 1927. 334 pp. $1.24.

French, T. E., and Svensen, C. L. *Mechanical drawing for high schools; a text with problem layouts.* New York, McGraw-Hill, 1927. 242 pp. $1.50.

Hagboldt, Peter, and Kaufmann, F. W. *A modern German grammar.* Chicago, Univ. of Chicago Press, 1927. 192 pp. $1.85.

Kinsman, D. O. *Economics; or, The science of business.* Boston, Ginn, 1927. 366 pp. $1.72.

Peck, A. S. *Industrial and commercial South America.* Rev. ed. New York, Crowell, 1927. 489 pp. $3.50.

Perkins, Clarence. *A history of European peoples.* Chicago, Rand McNally, 1927. 932 pp. $2.60.

Shakespeare, William. *The tragedy of Julius Caesar.* Ed. by E. B. Richards. Philadelphia, Winston, 1927. 144 pp. $.68.

Shakespeare, William. *Twelfth night; or, What you will.* Ed. by I. E. Melson. Philadelphia, Winston, 1927. 132 pp. $.68.

BOOKS FOR JUNIOR HIGH-SCHOOL STUDENTS

Barber, H. C. *Junior high school mathematics.* Boston, Houghton Mifflin, 1927. Seventh school year. 231 pp. $.92. Eighth school year. 267 pp. $1.00. Ninth school year, Everyday algebra. 372 pp. $1.24.

Bolenius, E. M. *Literature in the junior high school.* Boston, Houghton Mifflin, 1927. Book 2. 684 pp. $1.48.

Condon, R. J. ed. *The Atlantic readers.* Boston, Little, Brown, 1927. Book 5, Outward bound. 342 pp. $.85.

Davis, K. C. *Farm projects and problems; a complete text for elementary schools.* Philadelphia, Lippincott, 1927. 539 pp. $1.40.

Denney, J. V., and others. *Our English.* New York, Scribner, 1927. Seventh year. 279 pp. $1.00. Eighth year. 311 pp. $1.12.

Hauck, L. P. *The youngest rider.* Boston, Lothrop, Lee, 1927. 245 pp. $1.50.

Holden, E. S. *The sciences; a reading book for children.* Rev. ed. Boston, Ginn, 1927. 224 pp. $.84.

Wood, H. E. *Progressive problems in mechanical drawing.* Chicago, Mentzer, Bush, 1927. Book one. 126 pp. $.96.

BOOKS FOR ELEMENTARY-SCHOOL STUDENTS

Allen, N. B., and Robinson, E. K. *Stories and sketches: stories of our earth.* Boston, Ginn, 1927. 30 pp. $.36.

Asquith, Cynthia. *Martin's adventure.* New York, Scribner, 1927. 246 pp. $1.75.

Beeby, D. J., and Beeby, Dorothea. *America's roots in the past.* New York, Merrill, 1927. 424 pp. $1.00.

Bigham, M. A. *The bad little rabbit and other stories.* Boston, Little, Brown, 1927. 155 pp. $.75.

Blaisdell, E. A. *Toy town.* Boston, Little, Brown, 1927. 130 pp. $1.00.

Bryce, C. T., and Hardy, R. L. *Playtime.* New York, Newson, 1927. 128 pp. $.68.

Buckingham, B. R., and Osburn, W. J. *Buckingham-Osburn searchlight arithmetics.* Boston, Ginn, 1927. Book 1. 353 pp. $.76.

Carpenter, F. G. *Australia, the Philippines and other islands of the sea.* New York, American Bk. Co., 1927. 432 pp. $1.00.

Coffman, Ramon. *The story of America.* Dansville, N. Y. Owen Pub. Co., 1927. Book 1, The age of discovery. 127 pp. $.72.

Dodge, R. E., and Lackey, E. E. *Dodge-Lackey elementary geography.* Chicago, Rand McNally, 1927. 338 pp. $1.75.

Ellingwood, L. B. *Cubby bear.* Boston, Ginn, 1927. 126 pp. $.72.

Coffman, Ramon. *The story of America.* Dansville, N. Y., Owen Pub. Co., 1927. 256 pp. $.96.

Franck, H. A. *The Japanese empire, a geographical reader.* Dansville, N. Y., Owen Pub. Co., 1927. 256 pp. $.96.

Frye, A. E. *The brooklet's story.* Boston, Ginn, 1927. 189 pp. $.80.

Hageman, S. M. *Children of grizzly; how they learned the secrets of health.* Yonkers-on-Hudson, N. Y., World Bk. Co., 1927. 176 pp. $1.00.

Hazard, L. L. *The frontier in American literature.* New York, Crowell, 1927. 308 pp. $2.75.

Kallom, A. W., and Eby, Frederick. *The star speller.* New York, Newson, 1927. 159 pp. $.56.

McElroy, M. J. *A child's first book in reading.* New York, American Bk. Co., 1927. 32 pp. $.24.

Manly, J. M., and others. *Good reading.* New York, Scribner, 1927. Fourth reader. 352 pp. $.88.

Peck, L. B. *Stories east and west.* Boston, Little, Brown, 1927. 218 pp. $.80.

Rice, L. W. *The box in the sand.* Boston, Ginn, 1927. 109 pp. $.72.

Smith, N. B., and Courtis, S. A. *Picture-story reading lessons, series II.* Yonkers-on-Hudson, N. Y., World Bk. Co., 1927. My story book. 154 pp. $.68. Dictionary. 96 pp. $.48. Teacher's manual. 221 pp. $1.00. Word cards. $1.68 per set.

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Clarke, F. E. comp. *Poetry's plea for animals.* Boston, Lothrop, Lee, 1927. 426 pp. $3.00.

Fowler, H. W. *A dictionary of modern English usage.* New York, Oxford Univ. Press, 1927. 742 pp. $3.00.

Fowler, F. G., and Fowler, H. W. comp. *The pocket Oxford dictionary.* American ed. rev. by George van Santvoord. New York, Oxford Univ. Press, 1927. 1029 pp. $2.00.

McCarthy, M. F., and Wagner, M. E. *The American reader for new Americans.* New York, Hinds, Hayden, 1927. 257 pp. $.84.

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